innovair

SERVICE MANUAL

WOE10C2DB8,HOE10C2MR83
WOE13C2DB8,HOE13C2MR83
WOE18C2DB8,HOE18C2MR83
WOE24C2DB8,HOE24C2MR83

AIR CONDITIONER

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1. Precaution

1.1 Safety Precaution

- **To prevent injury to the user or other people and property damage, the following instructions must be followed.**
- **Incorrect operation due to ignoring instruction will cause harm or damage.**
- **Before service unit, be sure to read this service manual at first.**

1.2 Warning

➢ Installation

- **Do not use a defective or underrated circuit breaker. Use this appliance on a dedicated circuit.**

There is risk of fire or electric shock.

- **For electrical work, contact the dealer, seller, a qualified electrician, or an Authorized service center.**

Do not disassemble or repair the product, there is risk of fire or electric shock.

- **Always ground the product.**

There is risk of fire or electric shock.

- **Install the panel and the cover of control box securely.**

There is risk of fire of electric shock.

- **Always install a dedicated circuit and breaker.**

Improper wiring or installation may cause fore or electric shock.

- **Use the correctly rated breaker of fuse.**

There is risk of fire or electric shock.

- **Do not modify or extend the power cable.**

There is risk of fire or electric shock.

- **Do not install, remove, or reinstall the unit by yourself(customer).**

There is risk of fire, electric shock, explosion, or injury.

- **Be caution when unpacking and installing the product.**

Sharp edges could cause injury, be especially careful of the case edges and the fins on the

condenser and evaporator.

- **For installation, always contact the dealer or an Authorized service center.**

There is risk of fire, electric shock, explosion, or injury.

- **Do not install the product on a defective installation stand.**

It may cause injury, accident, or damage to the product.

- **Be sure the installation area does not deteriorate with age.**

If the base collapses, the air conditioner could fall with it, causing property damage, product failure, and personal injury.

- **Do not let the air conditioner run for a long time when the humidity is very high and a door or a window is left open.**

Moisture may condense and wet or damage furniture.

- **Take care to ensure that power cable could not be pulled out or damaged during operation.**

There is risk of fire or electric shock.

- **Do not place anything on the power cable.**

There is risk of fire or electric shock.

- **Do not plug or unplug the power supply plug during operation.**

There is risk of fire or electric shock.

- **Do not touch (operation) the product with wet hands.**

There is risk of fire or electric shock.

- **Do not place a heater or other appliance near the power cable.**

There is risk of fire and electric shock.

- **Do not allow water to run into electric parts.**

It may cause fire, failure of the product, or electric shock.

- **Do not store or use flammable gas or combustible near the product.**

There is risk of fire or failure of product.

- **Do not use the product in a tightly closed space for a long time.**

Oxygen deficiency could occur.

- **When flammable gas leaks, turn off the gas and open a window for ventilation before turn the product on.**

Do not use the telephone or turn switches on or off.

There is risk of explosion or fire.

- **If strange sounds, or small or smoke comes from product. Turn the breaker off or disconnect the power supply cable.**

There is risk of electric shock or fire.

- **Stop operation and close the window in storm or hurricane. If possible, remove the product from the window before the hurricane arrives.**

There is risk of property damage, failure of product, or electric shock.

- **Do not open the inlet grill of the product during operation. (Do not touch the electrostatic filter, if the unit is so equipped.)**

There is risk of physical injury, electric shock, or product failure.

- **When the product is soaked (flooded or submerged), contact an Authorized service center.**

There is risk of fire or electric shock.

- **Be caution that water could not enter the product.**

There is risk of fire, electric shock, or product damage.

- **Ventilate the product from time to time when operating it together with a stove, etc.**

There is risk of fire or electric shock.

- **Turn the main power off when cleaning or maintaining the product.**

There is risk of electric shock.

- **When the product is not be used for a long time, disconnect the power supply plug or turn off the breaker.**

There is risk of product damage or failure, or unintended operation.

- **Take care to ensure that nobody could step on or fall onto the outdoor unit.**

This could result in personal injury and product damage.

➢ CAUTION

- **Always check for gas (refrigerant) leakage after installation or repair of product.**

Low refrigerant levels may cause failure of product.

- **Install the drain hose to ensure that water is drained away properly.**

A bad connection may cause water leakage.

- **Keep level even when installing the product.**

It can avoid vibration of water leakage.

- **Do not install the product where the noise or hot air from the outdoor unit could damage the neighborhoods.**

It may cause a problem for your neighbors.

- **Use two or more people to lift and transport the product.**

Avoid personal injury.

- **Do not install the product where it will be exposed to sea wind (salt spray) directly.**

It may cause corrosion on the product. Corrosion, particularly on the condenser and evaporator fins, could cause product malfunction or inefficient operation.

➢ Operational

- **Do not expose the skin directly to cool air for long periods of time. (Do not sit in the draft).**

This could harm to your health.

- **Do not use the product for special purposes, such as preserving foods, works of art, etc. It is a consumer air conditioner, not a precision refrigerant system.**

There is risk of damage or loss of property.

- **Do not block the inlet or outlet of air flow.**

It may cause product failure.

- **Use a soft cloth to clean. Do not use harsh detergents, solvents, etc.**

There is risk of fire, electric shock, or damage to the plastic parts of the product.

- **Do not touch the metal parts of the product when removing the air filter. They are very sharp.**

There is risk of personal injury.

- **Do not step on or put anything on the product. (outdoor units)**

There is risk of personal injury and failure of product.

- **Always insert the filter securely. Clean the filter every two weeks or more often if necessary.**

A dirty filter reduces the efficiency of the air conditioner and could cause product malfunction or damage.

- **Do not insert hands or other object through air inlet or outlet while the product is**

operated.

There are sharp and moving parts that could cause personal injury.

- **Do not drink the water drained from the product.**

It is not sanitary could cause serious health issues.

- **Use a firm stool or ladder when cleaning or maintaining the product.**

Be careful and avoid personal injury.

- **Replace the all batteries in the remote control with new ones of the same type. Do not mix old and mew batteries or different types of batteries.**

There is risk of fire or explosion.

- **Do not recharge or disassemble the batteries. Do not dispose of batteries in a fire.**

They may burn of explode.

- **If the liquid from the batteries gets onto your skin or clothes, wash it well with clean water. Do not use the remote of the batteries have leaked.**

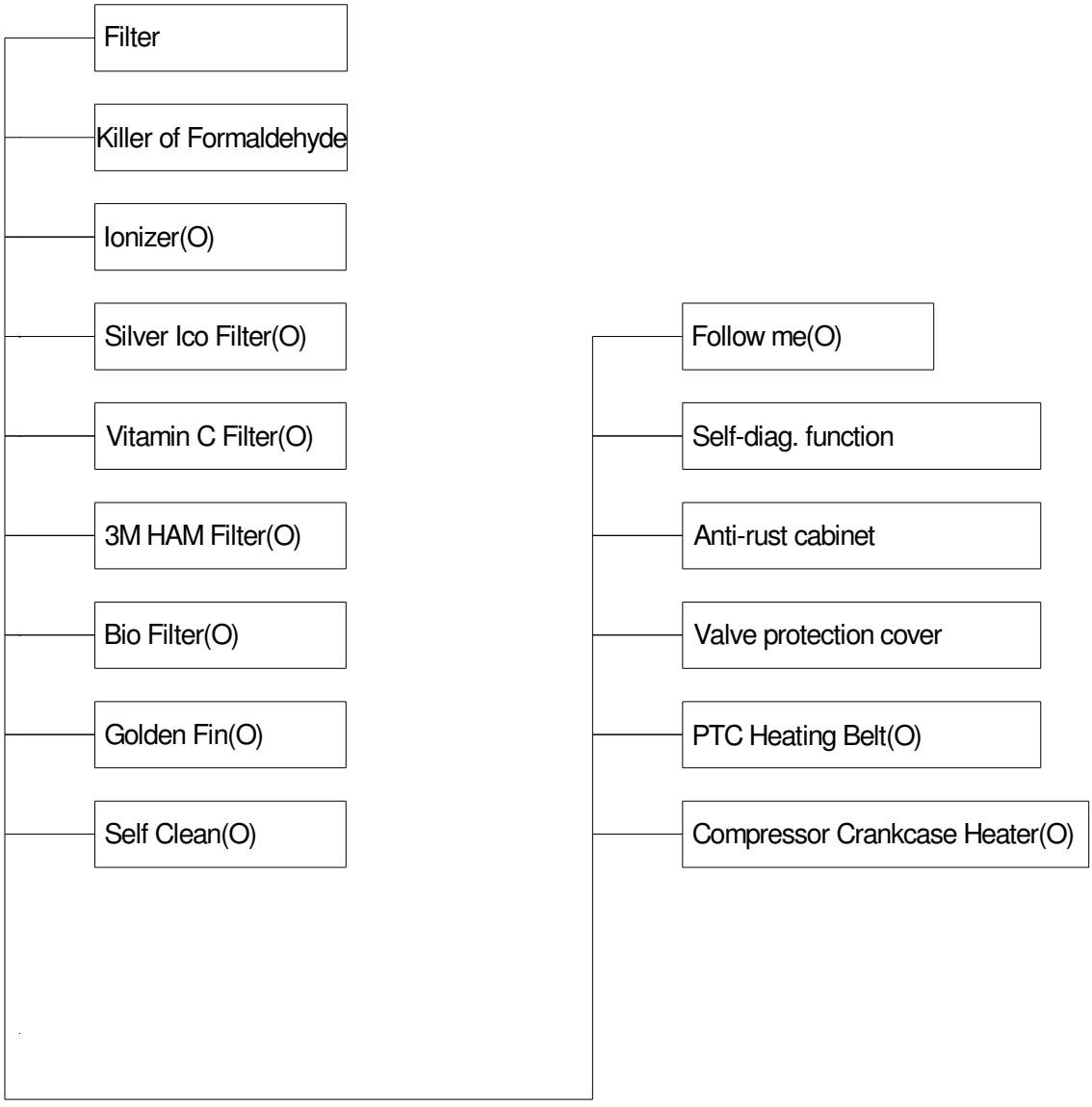
The chemical in batteries could cause burns or other health hazards

The designs, and information in this book are subject to change without notice for product improvement.

2. Function

Model Names of Indoor/Outdoor Units

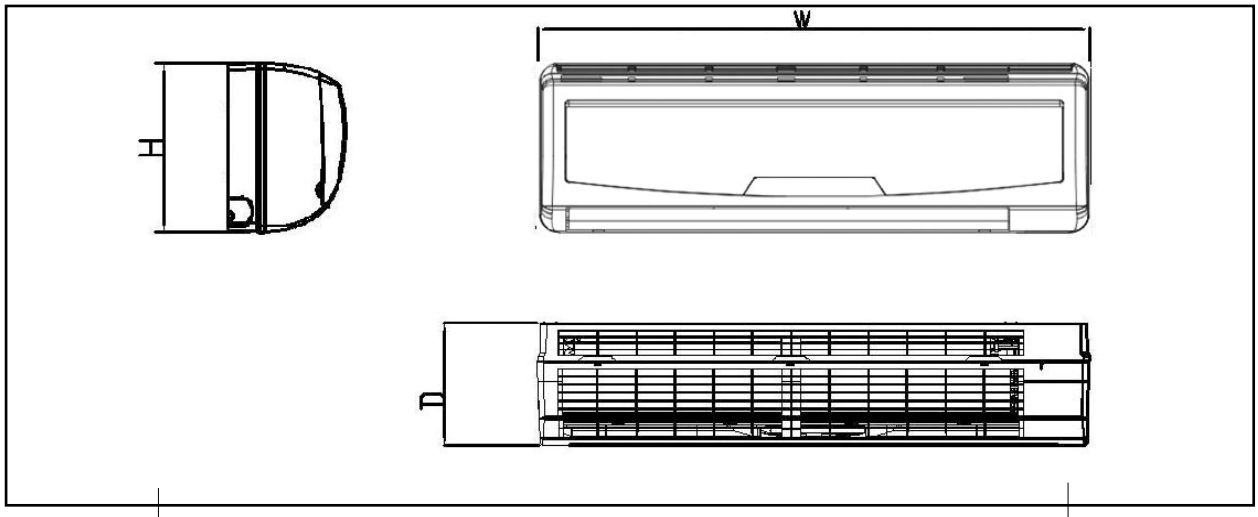
Series	Capacity	Indoor units	Outdoor units
On-Off	9k	WOE10C2DB8	HOE10C2MR83
	12k	WOE13C2DB8	HOE13C2MR83
	18k	WOE18C2DB8	HOE18C2MR83
	24k	WOE24C2DB8	HOE24C2MR83

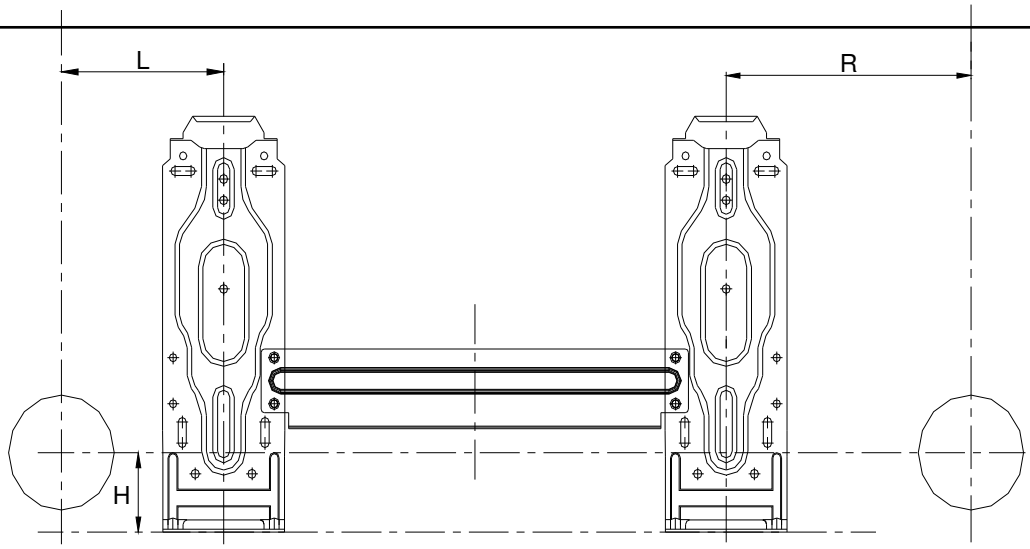


O: optional function

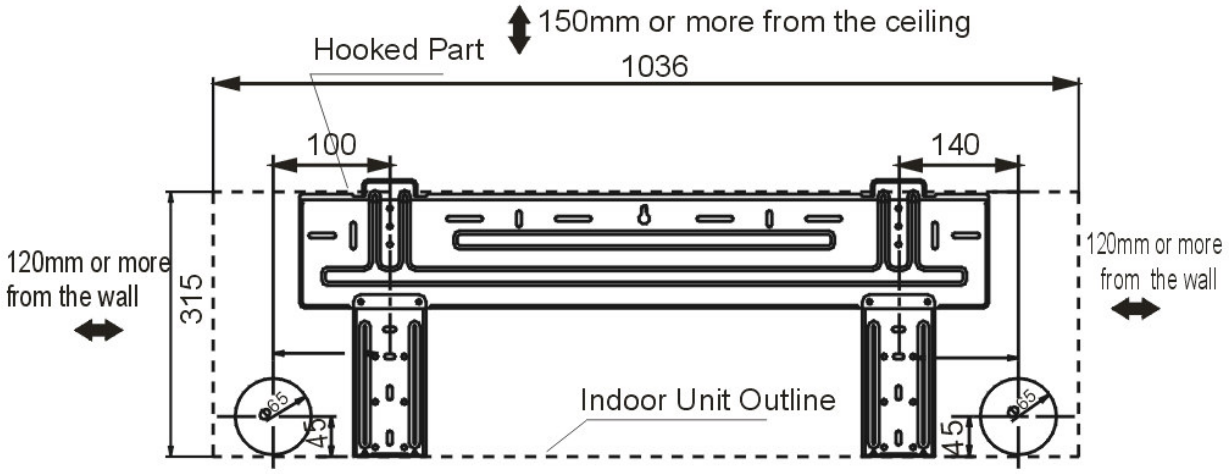
3. Dimension

3.1 Indoor Units



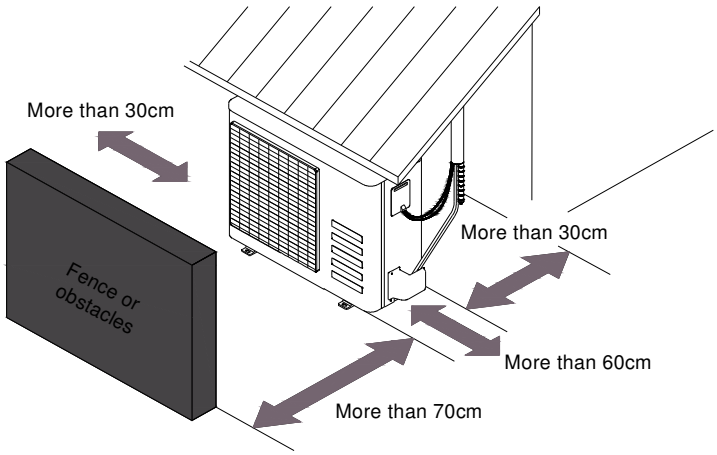


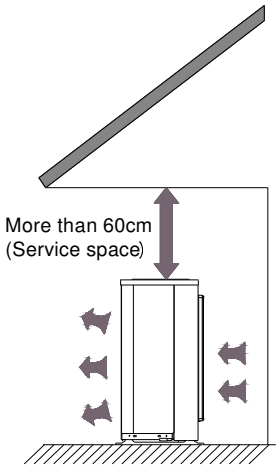
Model	R(mm)	L(mm)	H(mm)	Dimension of installation hole(mm)
WOE10C2DB8	111.5	100	45	Φ65
WOE13C2DB8	83.5	100	45	
WOE18C2DB8	139	100	45	
WOE24C2DB8	207	150	45	

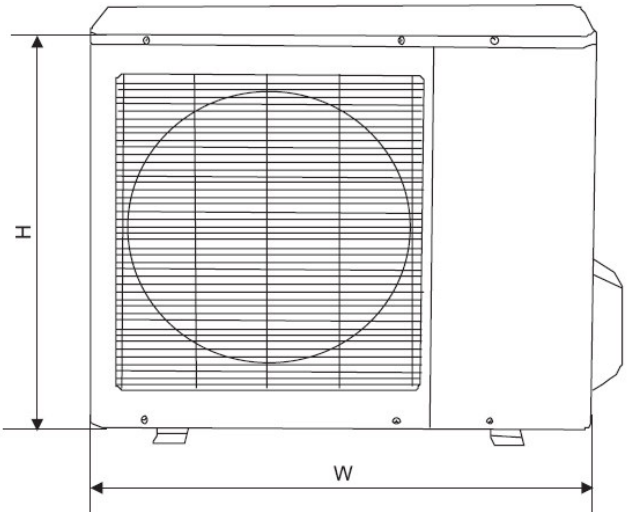


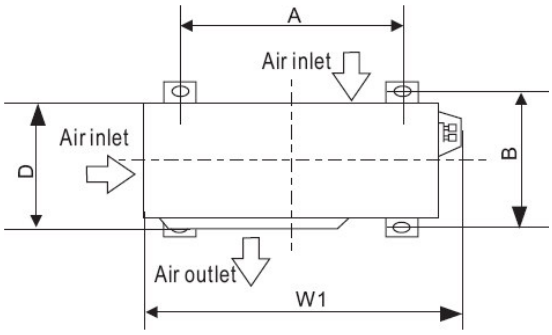
Model	W	H	D
WOE10C2DB8	710	250	189
WOE13C2DB8	790	275	196
WOE18C2DB8	930	275	198
WOE24C2DB8	1036	315	230

3.2 Outdoor Units





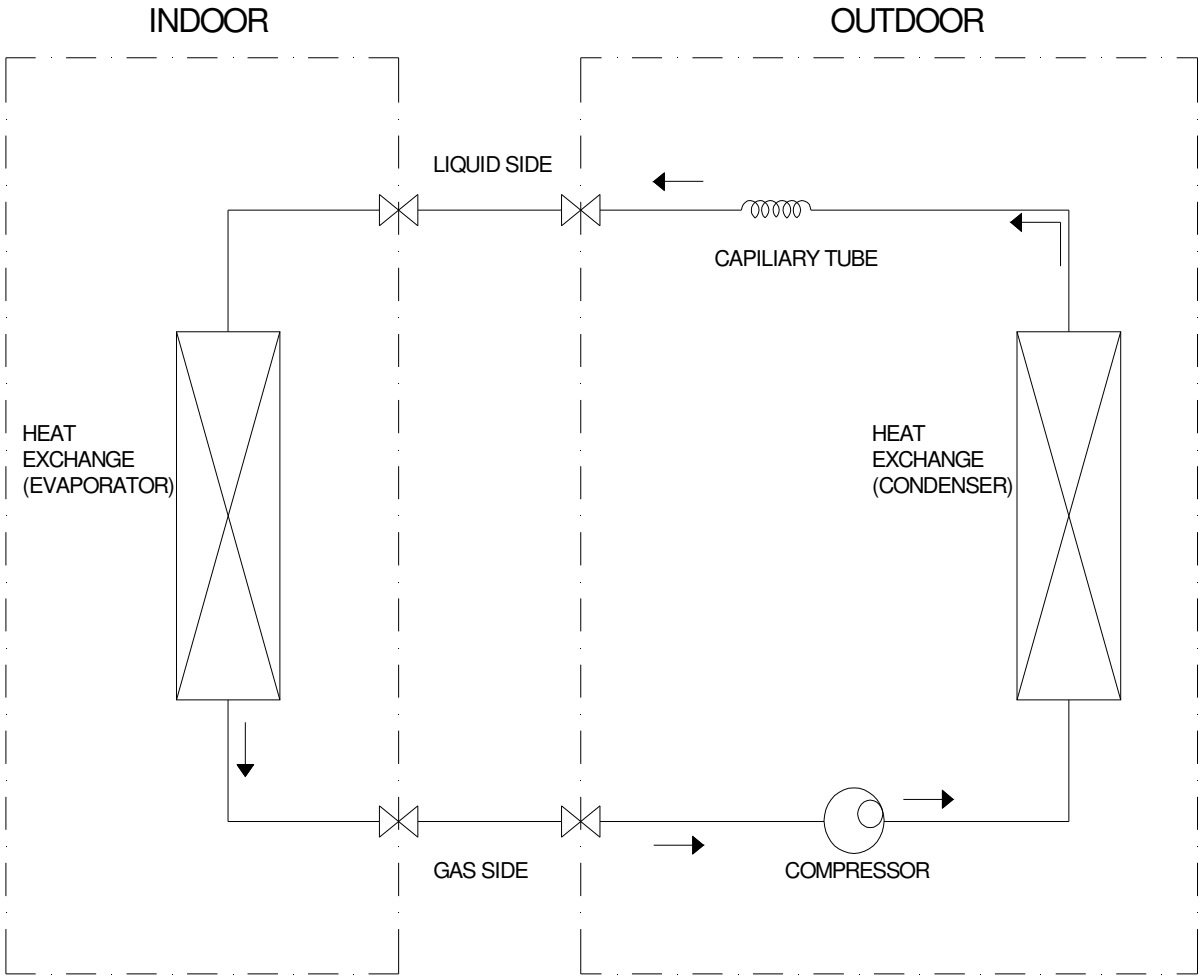




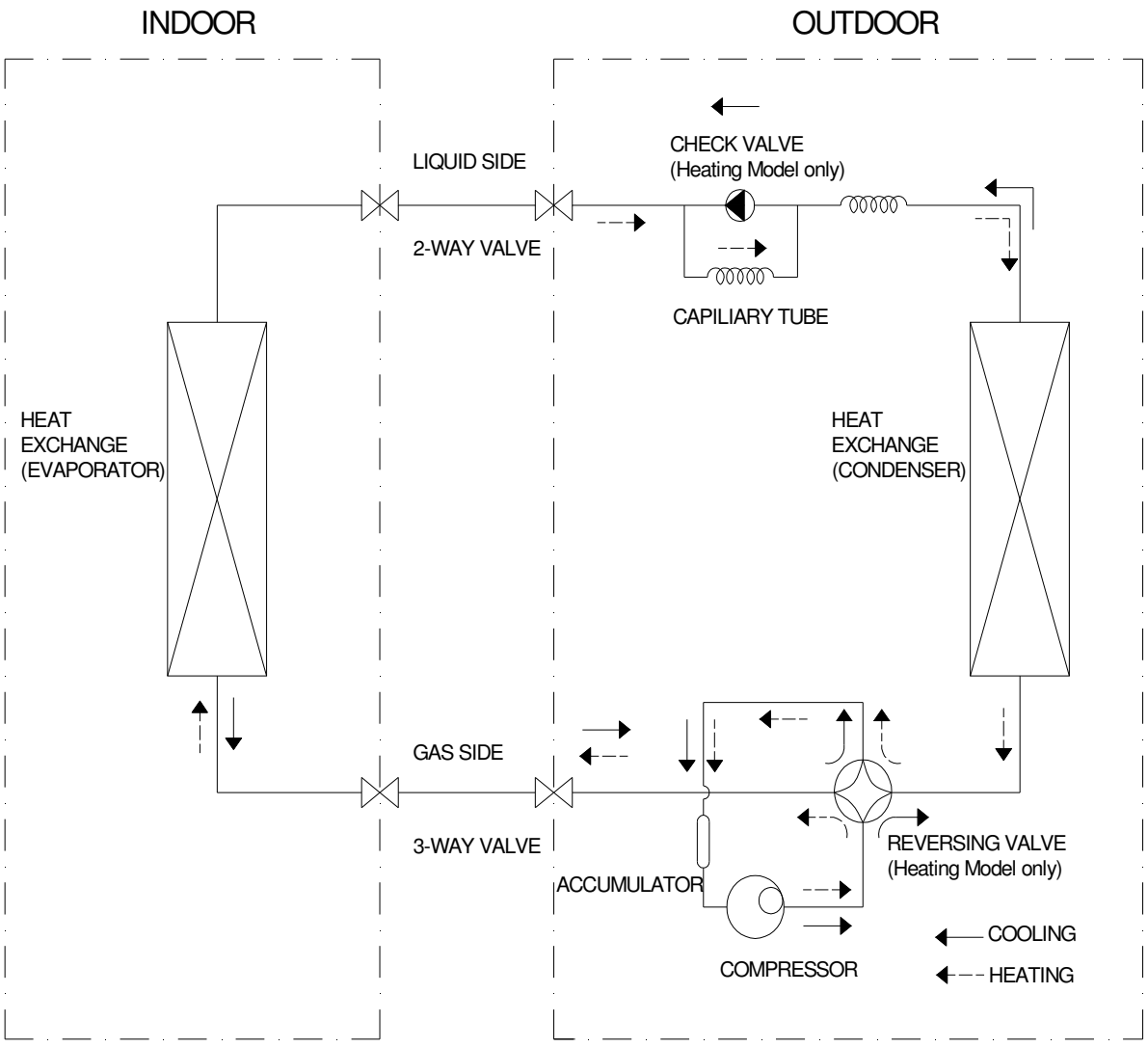
Model	W	D	H	W1	A	B
HOE18C2MR83	780	250	540	843	549	276
HOE24C2MR83	820	330	595	870	523	340

4. Refrigerant Cycle Diagram

Cooling only models:



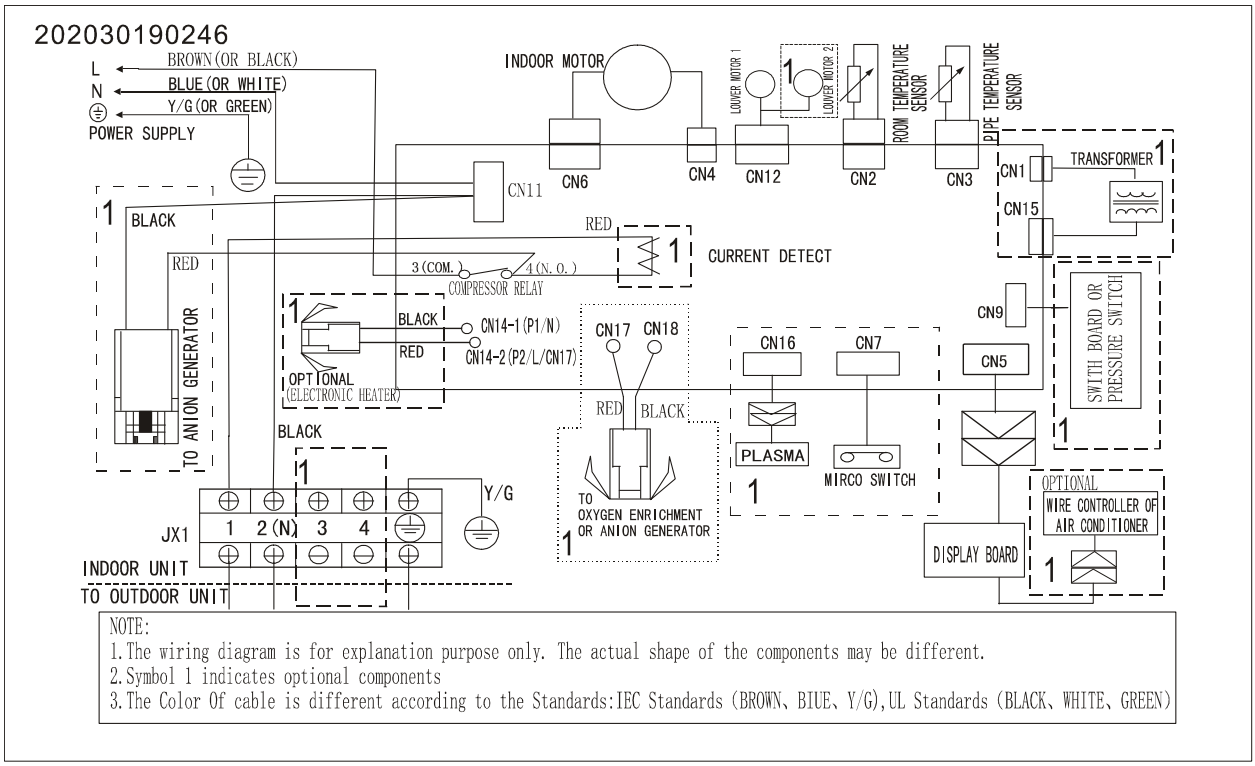
Heating pump modes：



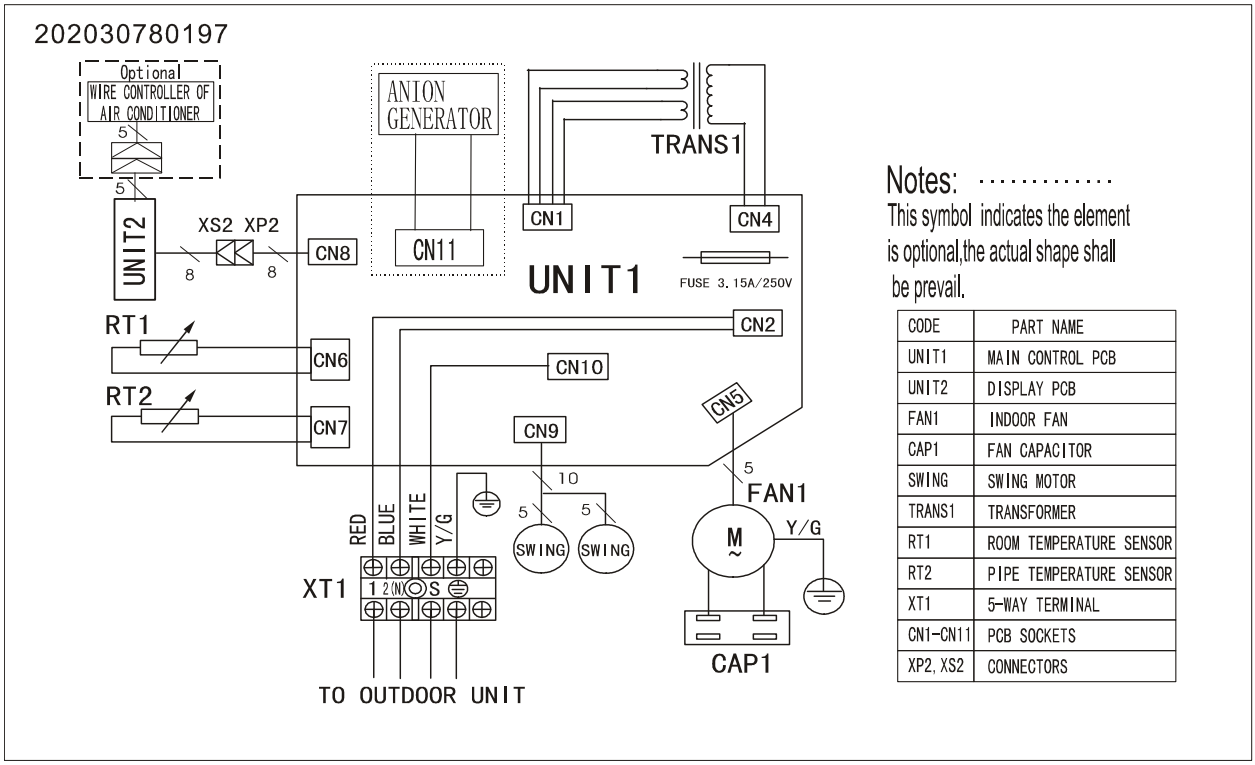
5. Wiring Diagram

5.1 Indoor Units

WOE10C2DB8, WOE13C2DB8, WOE18C2DB8

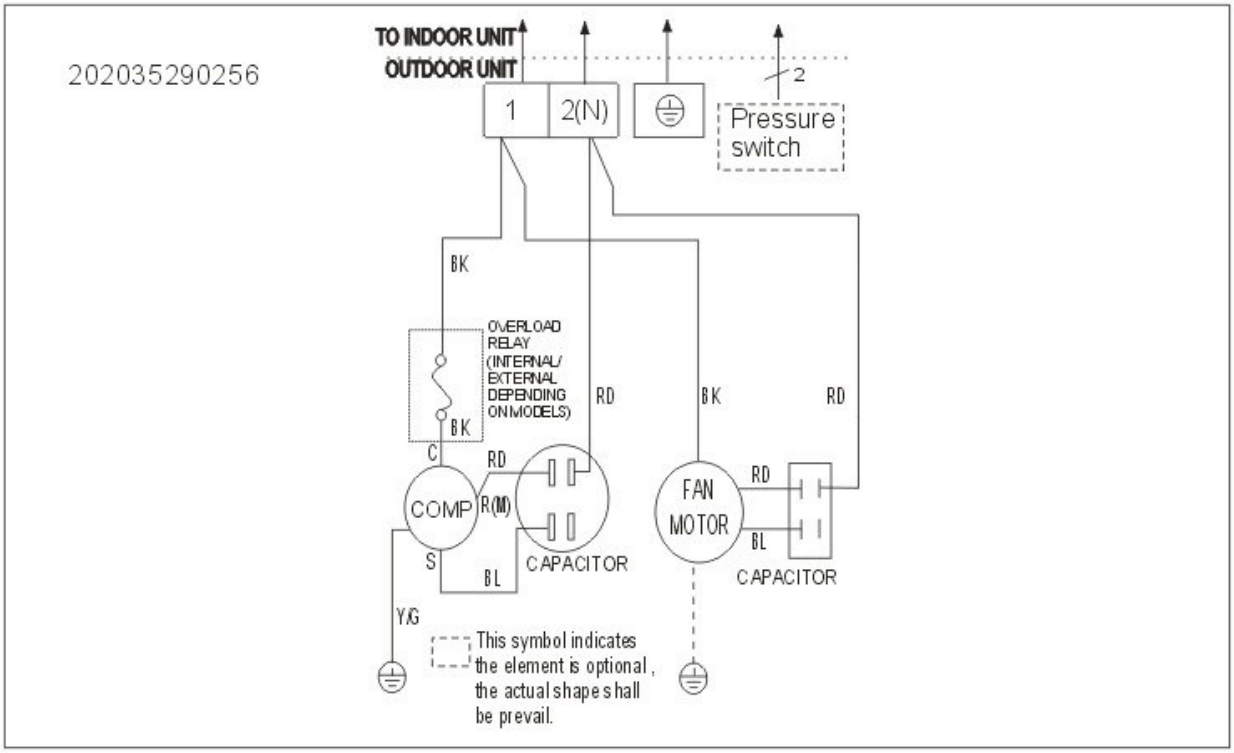


WOE24C2DB8,

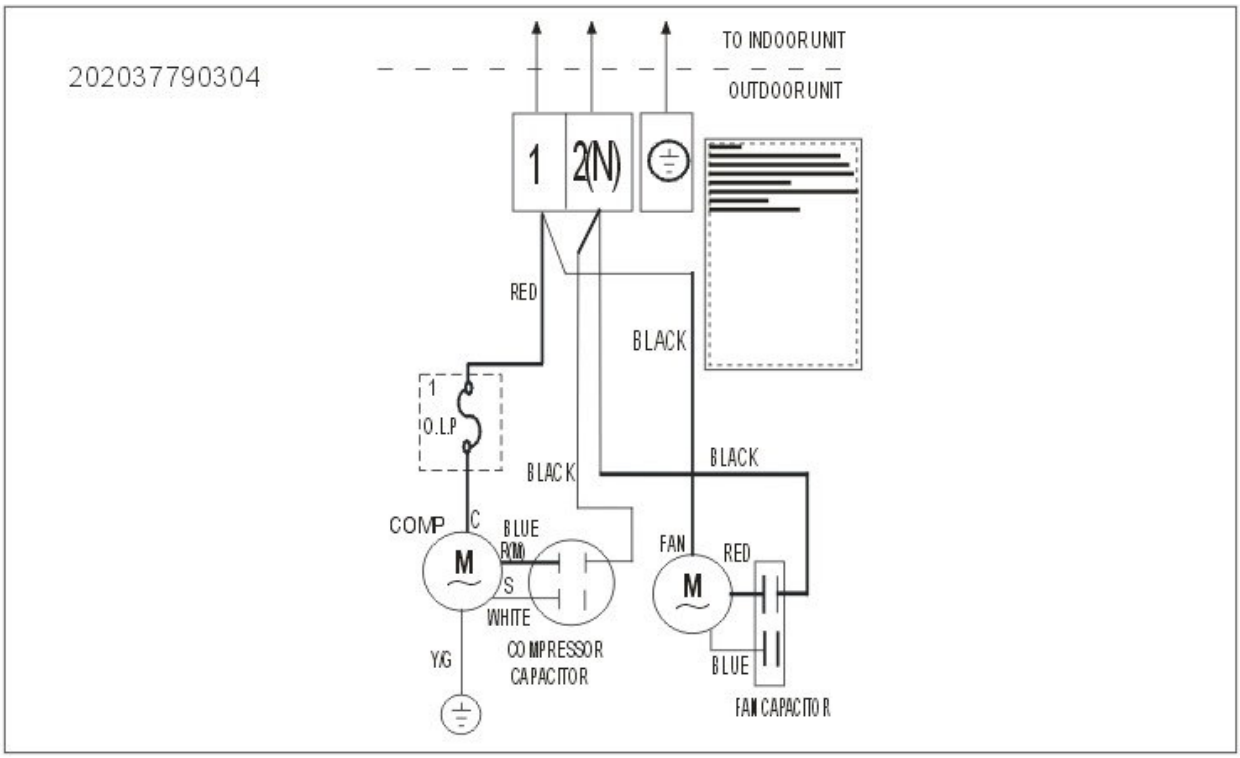


5.2 Outdoor Units

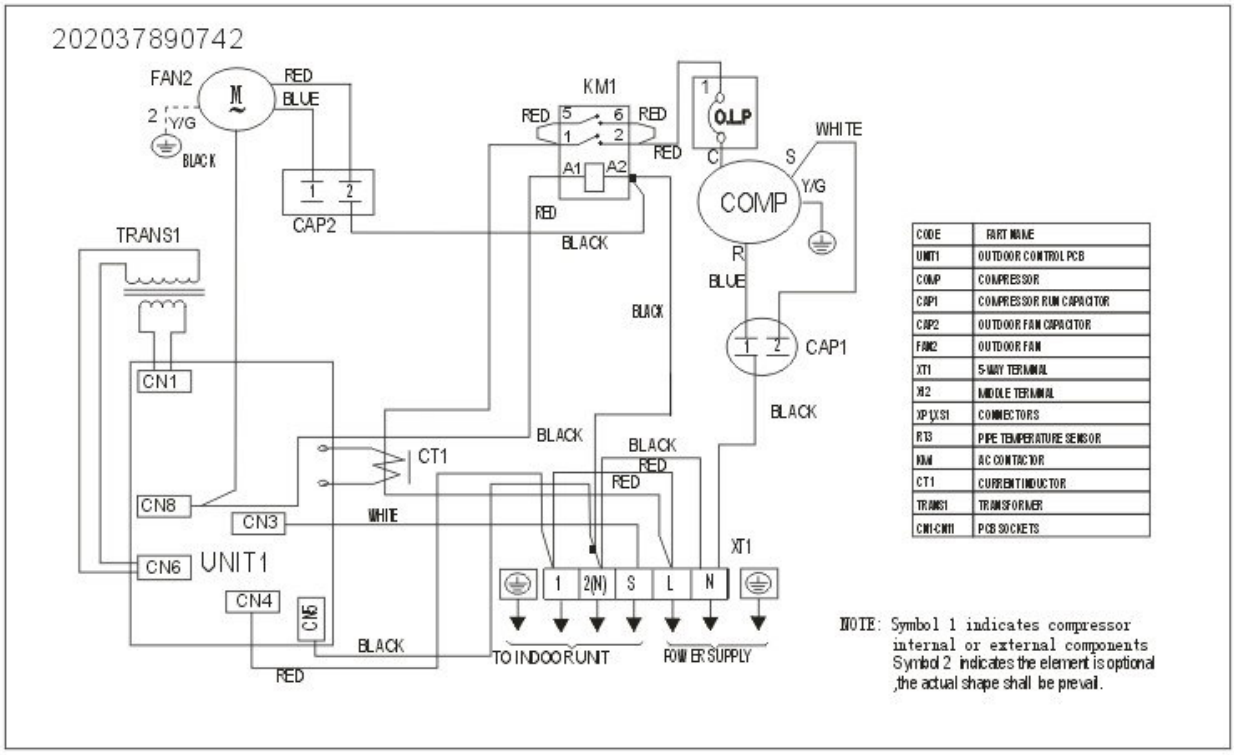
HOE10C2MR83, HOE13C2MR83,



HOE18C2MR83



HOE24C2MR83



CODE	PART NAME
UNIT1	OUTDOOR CONTROL PCB
COMP	COMPRESSOR
CAP1	COMPRESSOR RUN CAPACITOR
CAP2	OUTDOOR FAN CAPACITOR
FAN2	OUTDOOR FAN
XT1	5-WAY TERMINAL
XT2	MIDDLE TERMINAL
XP1,XS1	CONNECTORS
RT3	PIPE TEMPERATURE SENSOR
KM1	AC CONTACTOR
CT1	CURRENT INDUCTOR
TRANS1	TRANSFORMER
CN1-CN11	PCB SOCKETS

6. Installation details

6.1 Wrench torque sheet for installation

Outside diameter		Torque	Additional tightening torque
mm	inch	N.cm	N.cm
Φ6.35	1/4	1500 (153kgf.cm)	1600 (163kgf.cm)
Φ9.52	3/8	2500 (255kgf.cm)	2600 (265kgf.cm)
Φ12.7	1/2	3500 (357kgf.cm)	3600 (367kgf.cm)
Φ15.9	5/8	4500 (459kgf.cm)	4700 (479kgf.cm)

6.2 Connecting the cables

The power cord of connect should be selected according to the following specifications sheet.

Rated current of appliance	Nominal cross-sectional area (mm^2)
>3 and ≤6	0.75
>6 and ≤10	1.0
>10 and ≤16	1.5
>16 and ≤25	2.5

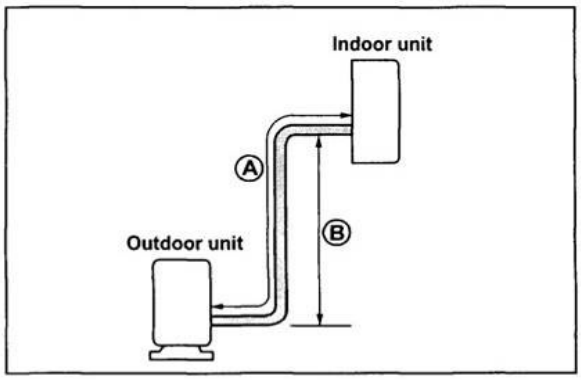
The cable size and the current of the fuse or switch are determined by the maximum current indicated on the nameplate which located on the side panel of the unit. Please refer to the nameplate before selecting the cable, fuse and switch.

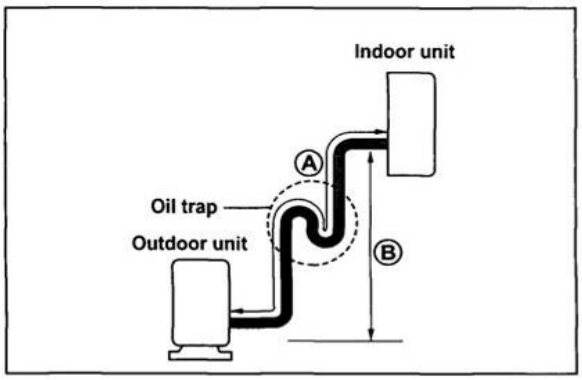
6.3 Pipe length and the elevation

The pipe length and refrigerant amount:

Model	Connective pipe length	Air purging	Additional amount of refrigerant
All	Less than 5m	Use vacuum pump	----------
7k,9k,12k,16k,17k,18k(R22)	More than 5m	Use vacuum pump	(Pipe length-5)x30g/m
24k(R22)	More than 5m	Use vacuum pump	(Pipe length-5)x60g/m
9k,12k,18k,22k(R410a)	More than 5m	Use vacuum pump	(Pipe length-5)x20g/m
24k(R410a)	More than 5m	Use vacuum pump	(Pipe length-5)x40g/m

Model	**Standard length (m)**	**Max. Elevation B (m)**	**Max. Length A (m)**
7k,9k,12k,16k,17k(R22)	5	5	10
18k(R22)	5	8	15
24k(R22)	5	10	20
9k,12k (R410a)	5	8	20
18k,21k,22k,24k (R410a)	5	10	25





Caution:

The capacity test is based on the standard length and the maximum permissive length is based on the system reliability.

The oil trap should be installed per 5-7 meters.

6.4 Installation for the first time

Air and moisture in the refrigerant system have undesirable effects as below:

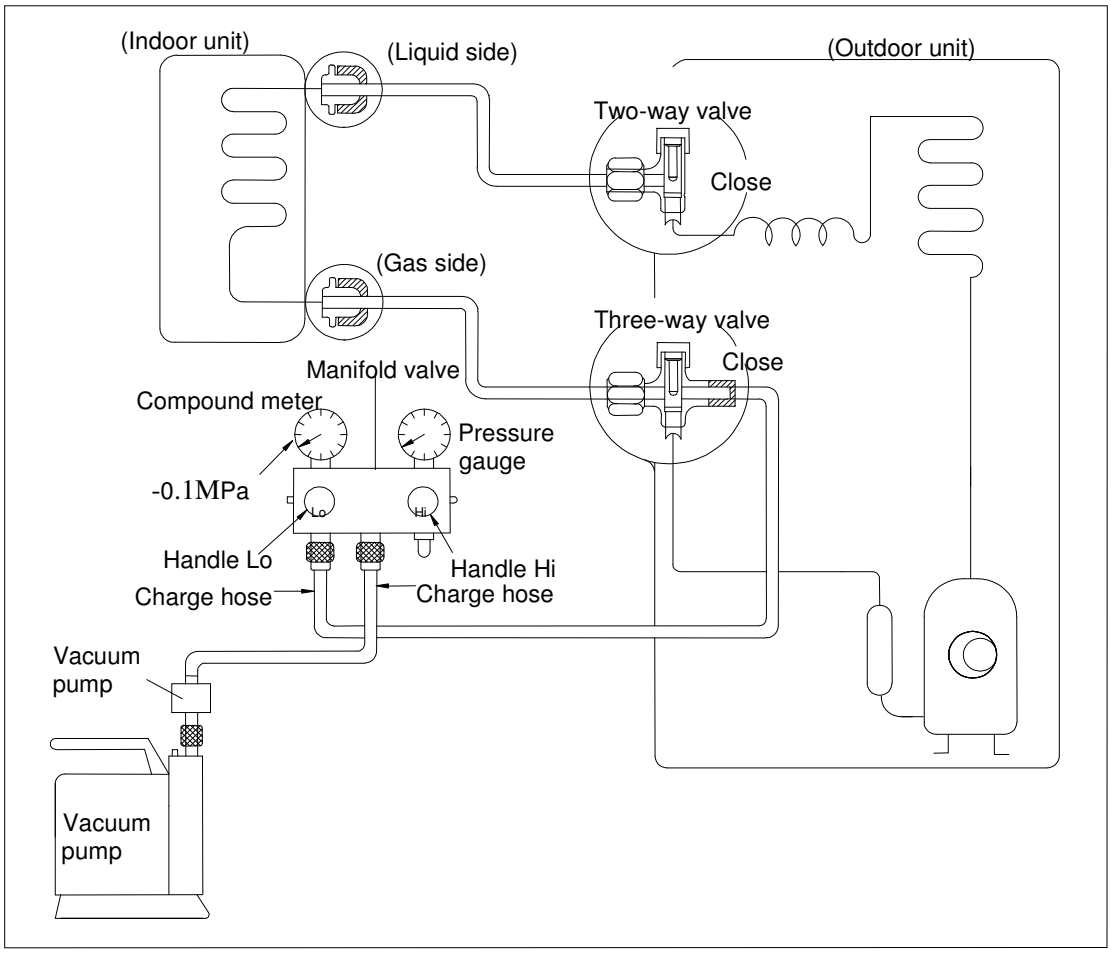
- Pressure in the system rises.
- Operating current rises.
- Cooling or heating efficiency drops.
- Moisture in the refrigerant circuit may freeze and block capillary tubing.
- Water may lead to corrosion of parts in the refrigerant system.

Therefore, the indoor units and the pipes between indoor and outdoor units must be leak tested and evacuated to remove gas and moisture from the system.

Gas leak check (Soap water method):

Apply soap water or a liquid neutral detergent on the indoor unit connections or outdoor unit connections by a soft brush to check for leakage of the connecting points of the piping. If bubbles come out, the pipes have leakage.

1. Air purging with vacuum pump



1) Completely tighten the flare nuts of the indoor and outdoor units, confirm that both the 2-way and 3-way valves are set to the closed position
2) Connect the charge hose with the push pin of handle lo to the 3-way valves gas service port..
3) Connect the charge hose of handle hi connection to the vacuum pump.
4) Fully open the handle Lo of the manifold valve.

5) Operate the vacuum pump to evacuate.

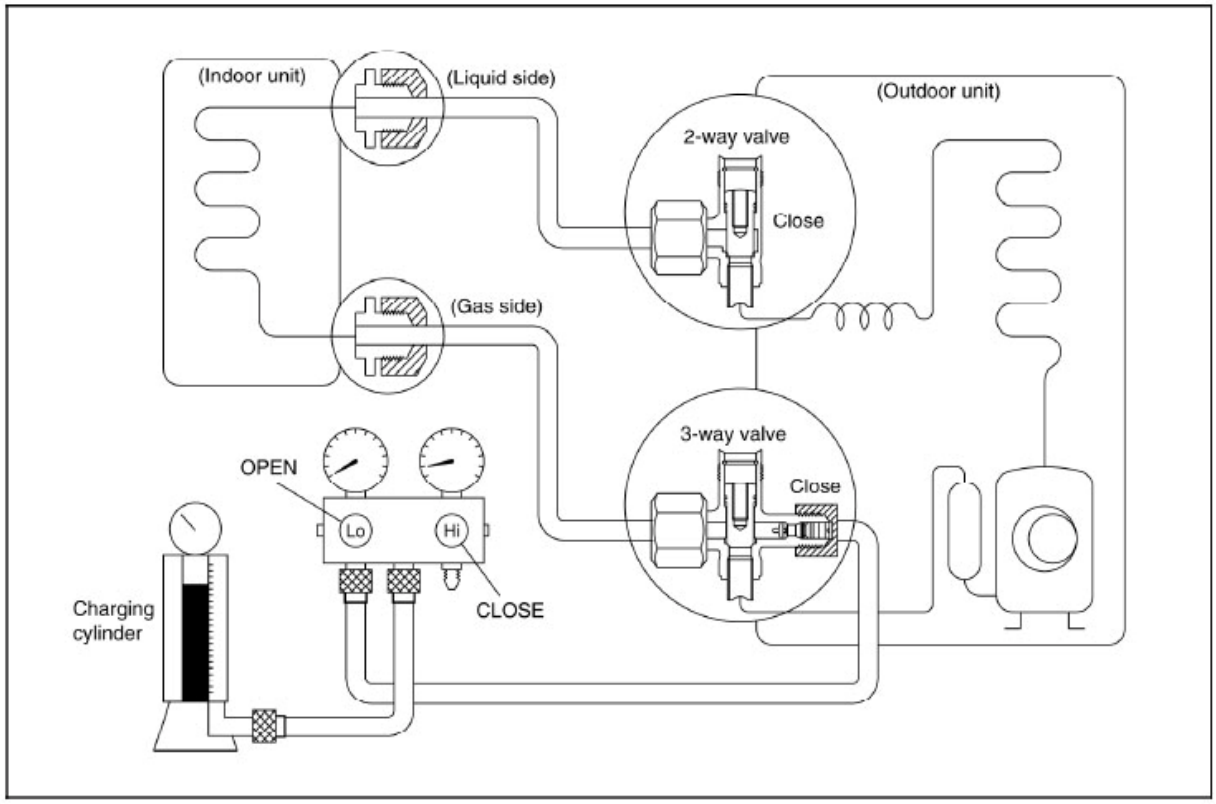
6) Make evacuation for 30 minutes and check whether the compound meter indicates -0.1Mpa. If the meter does not indicate -0.1Mpa after pumping 30 minutes, it should be pumped 20 minutes more. If the pressure can't achieve -0.1Mpa after pumping 50 minutes, please check if there are some leakage points.

Fully close the handle Lo valve of the manifold valve and stop the operation of the vacuum pump. Confirm that the gauge needle does not move (approximately 5 minutes after turning off the vacuum pump).

7) Turn the flare nut of the 3-way valves about 45° counterclockwise for 6 or 7seconds after the gas coming out, then tighten the flare nut again. Make sure the pressure display in the pressure indicator is a little higher than the atmosphere pressure. Then remove the charge hose from the 3 way valve.

8) Fully open the 2 way valve and 3 way valve and securely tighten the cap of the 3 way valve.

2. Air purging by refrigerant



Procedure:

1). Confirm that both the 2-way and 3-way valves are set to the closed position.

2). Connect the charge set and a charging cylinder to the service port of the 3-way valve.

3). Air purging

Open the valves on the charging cylinder and the charge set. Purge the air by loosening the flare nut on the 2-way valve approximately 45' for 3 seconds then closing it for 1 minute; repeat 3 times.

After purging the air, use a torque wrench to tighten the flare nut on the 2-way valve.

4). Check the gas leakage

Check the flare connections for gas leakage.

5). Discharge the refrigerant

Close the valve on the charging cylinder and discharge the refrigerant by loosening the flare nut on the 2-way valve approximately 45’ until the gauge indicates 0.3 to 0.5 Mpa.

6). Disconnect the charge set and the charging cylinder, and set the 2-way and 3-way valves to the open position.

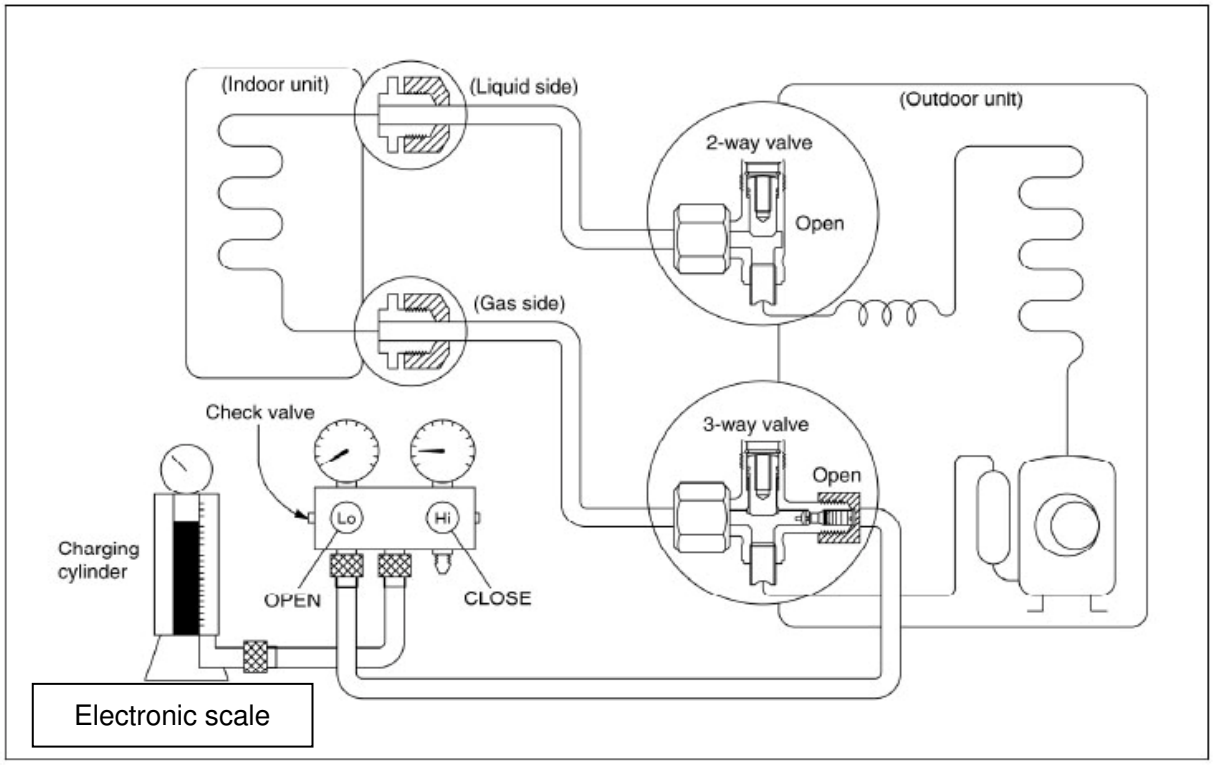
Be sure to use a hexagonal wrench to operate the valve stems.

7). Mount the valve stems nuts and the service port cap.

Be sure to use a torque wrench to tighten the service port cap to a torque 18N·m.

Be sure to check the gas leakage.

3. Adding the refrigerant if the pipe length >5m



Procedure:

1). Connect the charge hose to the charging cylinder, open the 2-way valve and the 3-way valve.

Connect the charge hose which you disconnected from the vacuum pump to the valve at the bottom of the cylinder. If the refrigerant is R410A, make the cylinder bottom up to ensure the liquid charge.

2). Purge the air from the charge hose

Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).

3) Put the charging cylinder onto the electronic scale and record the weight.

4) Operate the air conditioner at the cooling mode.

5) Open the valves (Low side) on the charge set and charge the system with liquid refrigerant.

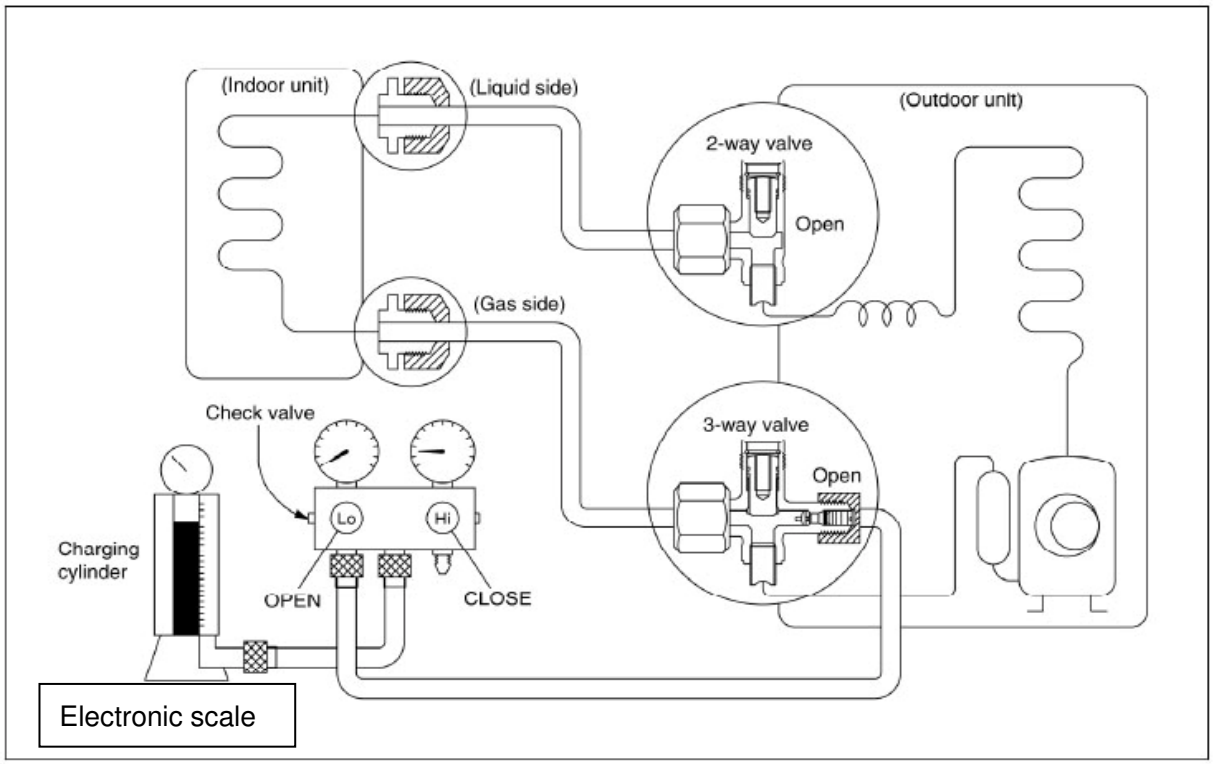
6).When the electronic scale displays the proper weight (refer to the table), disconnect the charge hose from the 3-way valve's service port immediately and turn off the air conditioner before disconnecting the hose.

7). Mount the valve stem caps and the service port

Use torque wrench to tighten the service port cap to a torque of 18N.m.

Be sure to check for gas leakage.

6.5 Adding the refrigerant after running the system for many years



Procedure:

1). Connect the charge hose to the 3-way service port, open the 2-way valve and the 3-way valve.

Connect the charge hose to the valve at the bottom of the cylinder. If the refrigerant is R410A, make the cylinder bottom up to ensure liquid charge.

2). Purge the air from the charge hose

Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).

3) Put the charging cylinder onto the electronic scale and record the weight.

4) Operate the air conditioner at the cooling mode.

5) Open the valves (Low side) on the charge set and charge the system with liquid refrigerant.

6).When the electronic scale displays the proper weight (refer to the gauge and the pressure of the low side), disconnect the charge hose from the 3-way valve's service port immediately and turn off the air conditioner before disconnecting the hose.

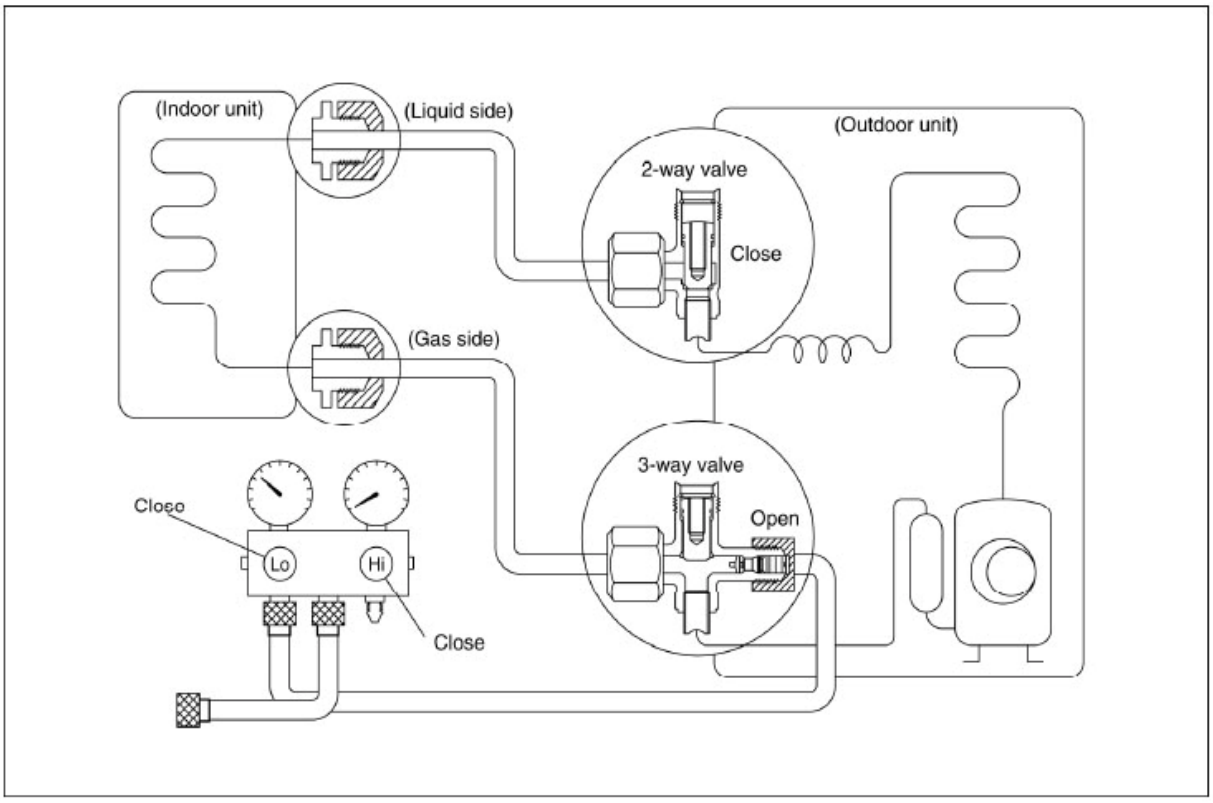
7). Mount the valve stem caps and the service port

Use torque wrench to tighten the service port cap to a torque of 18N.m.

Be sure to check for gas leakage.

6.6 Re-installation while the indoor unit need to be repaired

1. Collecting the refrigerant into the outdoor unit



Procedure

1). Confirm that both the 2-way and 3-way valves are set to the opened position.

Remove the valve stem caps and confirm that the valve stems are in the opened position.

Be sure to use a hexagonal wrench to operate the valve stems.

2). Connect the charge hose with the push pin of handle lo to the 3-way valves gas service port.

3). Air purging of the charge hose

Open the handle Lo valve of the manifold valve slightly to purge air from the charge hose for 5 seconds and then close it quickly.

4). Set the 2-way valve to the close position.

5). Operate the air conditioner at the cooling cycle and stop it when the gauge indicates 0.1MPa.

6). Set the 3-way valve to the closed position immediately

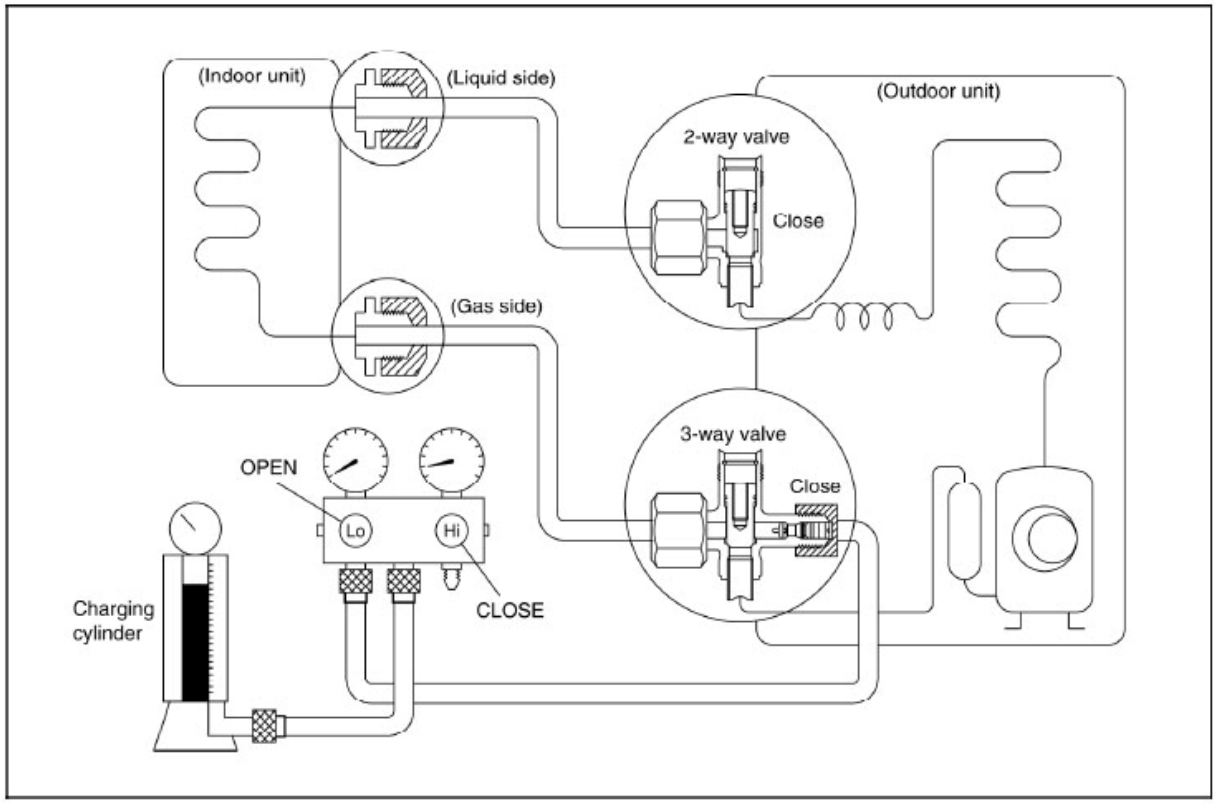
Do this quickly so that the gauge ends up indicating 0.3 to 0.5Mpa.

Disconnect the charge set, and tighten the 2-way and 3-way valve's stem nuts.

Use a torque wrench to tighten the 3-way valves service port cap to a torque of 18N.m.

Be sure to check for gas leakage.

2. Air purging by the refrigerant



Procedure:

1). Confirm that both the 2-way and 3-way valves are set to the closed position.

2). Connect the charge set and a charging cylinder to the service port of the 3-way valve.

Leave the valve on the charging cylinder closed.

3). Air purging

Open the valves on the charging cylinder and the charge set. Purge the air by loosening the flare nut on the 2-way valve approximately 45' for 3 seconds then closing it for 1 minute; repeat 3 times.

After purging the air, use a torque wrench to tighten the flare nut on the 2-way valve.

4). Check the gas leakage

Check the flare connections for gas leakage.

5). Discharge the refrigerant

Close the valve on the charging cylinder and discharge the refrigerant by loosening the flare nut on the 2-way valve approximately 45’ until the gauge indicates 0.3 to 0.5 Mpa.

6). Disconnect the charge set and the charging cylinder, and set the 2-way and 3-way valves to the open position.

Be sure to use a hexagonal wrench to operate the valve stems.

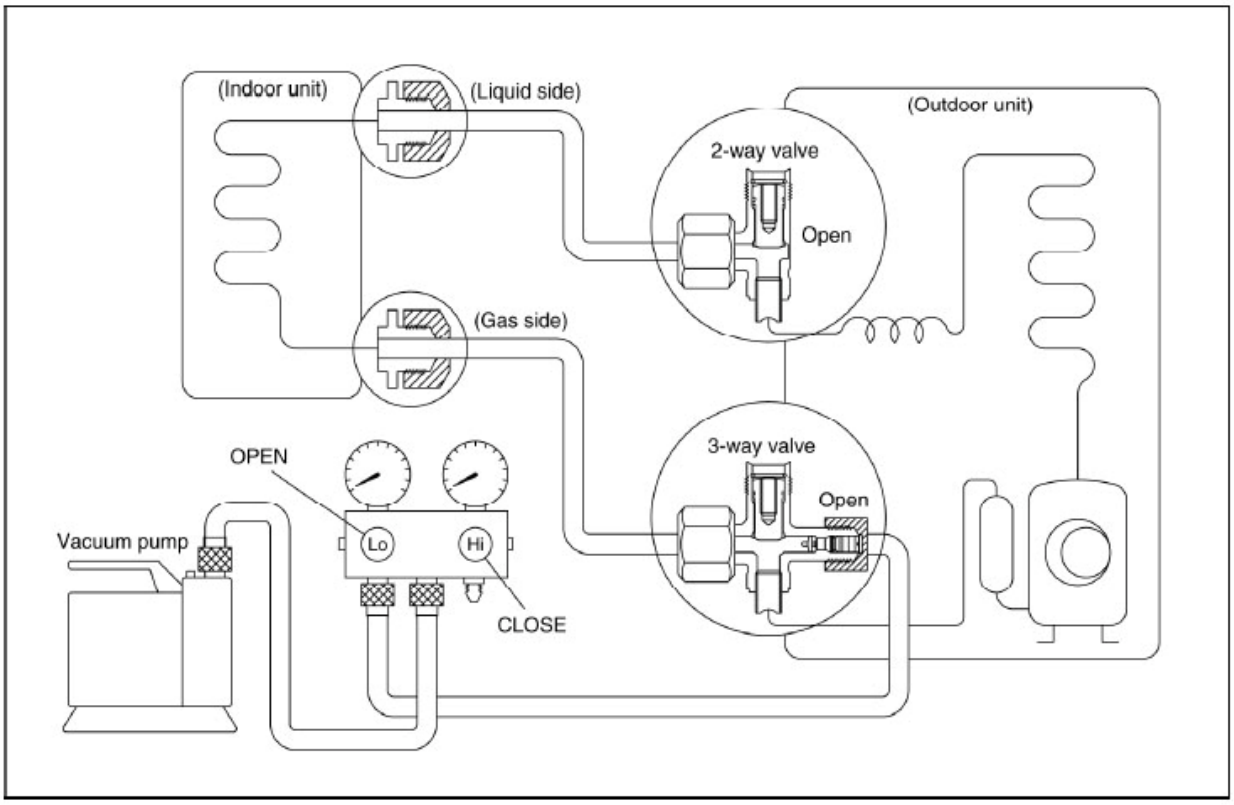
7). Mount the valve stems nuts and the service port cap.

Be sure to use a torque wrench to tighten the service port cap to a torque 18N.m.

Be sure to check the gas leakage.

6.7 Re-installation while the outdoor unit need to be repaired

1. Evacuation for the whole system



Procedure:

1). Confirm that both the 2-way and 3-way valves are set to the opened position.

2). Connect the vacuum pump to 3-way valve’s service port.

3). Evacuation for approximately one hour

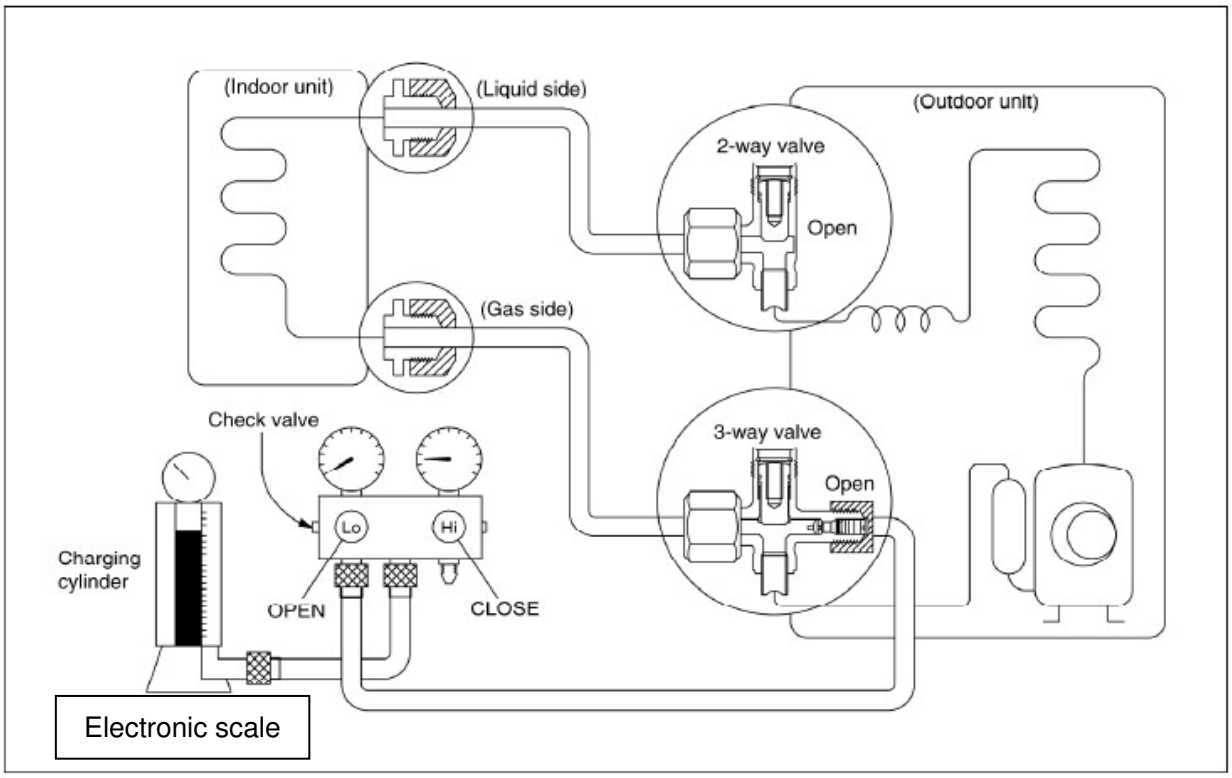
Confirm that the compound meter indicates -0.1Mpa.

4). Close the valve (Low side) on the charge set, turn off the vacuum pump, and confirm that the gauge

needle does not move (approximately 5 minutes after turning off the vacuum pump).

5). Disconnect the charge hose from the vacuum pump.

2. Refrigerant charging



Procedure:

1). Connect the charge hose to the charging cylinder, open the 2-way valve and the 3-way valve. Connect the charge hose which you disconnected from the vacuum pump to the valve at the bottom of the cylinder. If the refrigerant is R410A, make the cylinder bottom up to ensure liquid charge.

2). Purge the air from the charge hose

Open the valve at the bottom of the cylinder and press the check valve on the charge set to purge the air (be careful of the liquid refrigerant).

3) Put the charging cylinder onto the electronic scale and record the weight.

4). Open the valves (Low side) on the charge set and charge the system with liquid refrigerant.

If the system cannot be charge with the specified amount of refrigerant, or can be charged with a little at a time (approximately 150g each time) , operating the air conditioner in the cooling cycle; however, one time is not sufficient, wait approximately 1 minute and then repeat the procedure.

5).When the electronic scale displays the proper weight, disconnect the charge hose from the 3-way valve's service port immediately.

If the system has been charged with liquid refrigerant while operating the air conditioner, turn off the air

conditioner before disconnecting the hose.

6). Mounted the valve stem caps and the service port

Use torque wrench to tighten the service port cap to a torque of 18N.m.

Be sure to check for gas leakage.

7. Operation characteristics

<table>
<tr><th>Temperature
Mode</th><th>Cooling operation</th><th>Heating operation</th><th>Drying operation</th></tr>
<tr><td rowspan="2">Room temperature</td><td rowspan="2">17℃～32℃</td><td rowspan="2">0℃～30℃</td><td>10℃～32℃
(<21000Btu/h models)</td></tr>
<tr><td>17℃～32℃
(≥21000Btu/h models)</td></tr>
<tr><td rowspan="3">Outdoor temperature</td><td>18℃～43℃</td><td rowspan="3">-7℃～24℃</td><td>11℃～43℃
(<21000Btu/h models)</td></tr>
<tr><td>-5℃～43℃
(For the models with
low temperature cooling system)</td><td>18℃～43℃
(≥21000Btu/h models)</td></tr>
<tr><td>21℃～52℃(For special tropical models)</td><td>21℃～52℃
(For special tropical models)</td></tr>
</table>

CAUTION:

1. If air conditioner is used beyond the above conditions, the certain protections may action.

2. Room relative humidity should be less than 80%. If the air conditioner operates in excess of this value, the surface of the air conditioner may attract condensation water. In this case, please set the vertical air louver to its maximum angle (vertically to the floor), and set the fan to high speed.

8. Electronic function

8.1 Abbreviation

T1: Indoor ambient temperature

T2: Coil temperature of indoor heat exchanger

T3: Coil temperature of outdoor heat exchanger

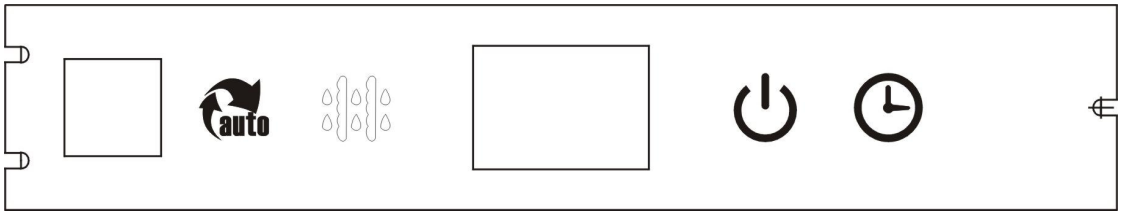
T4: Outdoor ambient temperature

T5: Compressor discharge temperature

Ts: Set temperature

8.2 Display function

8.2.1 Icon explanation on indoor display board.



auto	Auto indicator: This indicator illuminates when the air conditioner is in AUTO operation.
	PRE.-DEF. Indicator(for heat pump models only): This indicator illuminates when the air conditioner starts defrosting automatically or when the warm air control feature is activated in heating mode.
	OPERATION indicator: This indicator illuminates when the air conditioner is running.
	Timer indicator: This indicator illuminates when TIMER is set ON/OFF

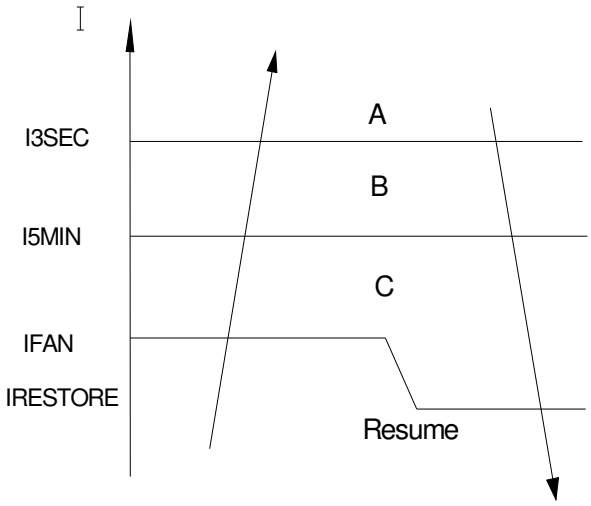
8.3 Main Protection

8.3.1 Time Delay at restart for compressor.

8.3.2 Fan Speed is out of control. (Only for 7k,9k, 12k,16k, 17k,

----When Indoor Fan Speed keeps too low or too high for certain time, the unit will stop and the LED will display the failure

8.3.3 Current protection



A zone: The current exceeds I_{3SEC} for 5 second, the compressor and outdoor fan will shut off. (For 9k, 12k, 17k,18k models)

A zone: The current exceeds I_{3SEC} for 3 second, the compressor and outdoor fan will shut off. (For21k, 24k models)

B zone: The current exceeds I_{5min} for 5 minute, the compressor and outdoor fan will shut off.

C zone: The current exceeds I_{FAN}, the outdoor fan will shut off if AC is in heating mode. If AC is in cooling mode, the indoor fan will run at low speed.

While

8.3.4 Zero crossing detection error protection (Only for 9k, 12k, 16k,17k,

If AC can not detect zero crossing signal for 4 minutes or the zero crossing signal time interval is not correct, the unit will stop and the LED will display the failure. The correct zero crossing signal time interval should be between 6-13ms.

8.3.5 Indoor / outdoor units communication protection (only for 21k,24k models)

If the indoor units can not receive the feedback signal from the outdoor units for 2 minutes, the AC will stop and display the failure.

8.4 Operation Modes and Functions

8.4.1 Fan mode.

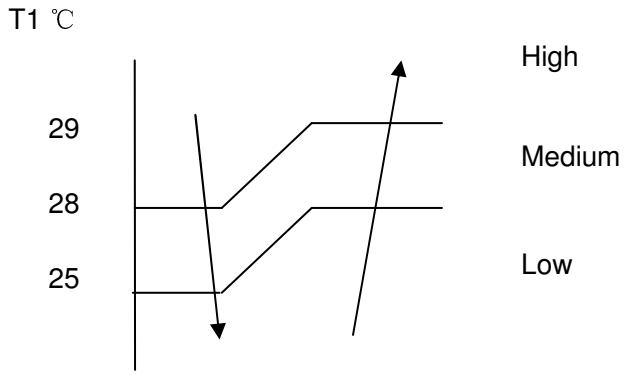
(1) Outdoor fan and compressor stop.

(2) Temperature setting function is disabled, and no setting temperature is displayed.

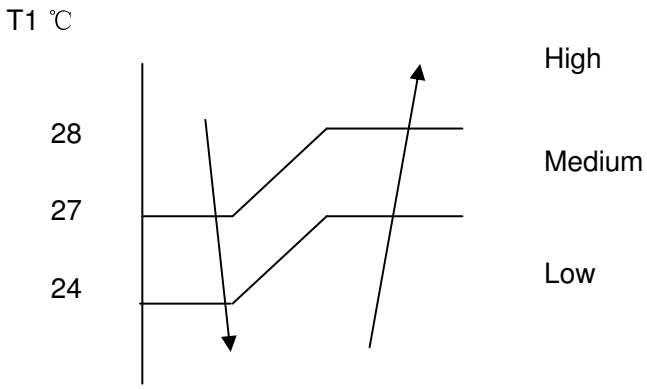
(3) Indoor fan can be set to high/med/low/auto.

(4) The louver operates same as in cooling mode.

(5) Auto fan:
For 7k, 9k, 12k, 16k,17k,18k,22k models:



For 21k, 24k models:



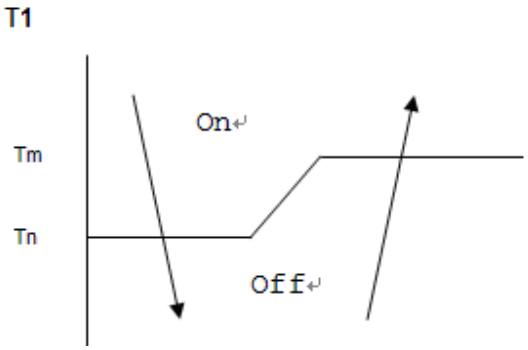
8.4.2 Cooling Mode

8.4.2.1 Four-way valve control

The four-way valve is closed.

8.4.2.2 Compressor and outdoor fan control

The action of the compressor and the outdoor fan are submitted to the following rule:



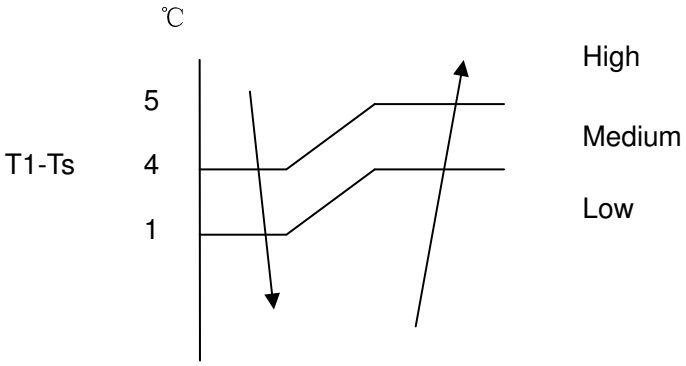
For MSR1-18CRN1-NB8(2T0032800278), MSR1-18CR-NB6, MSR1-22HRN1-NB8W:Tm=Ts, Tn=Ts-2

For other models, Tm=Ts+1, Tn=Ts

8.4.2.3 Indoor fan running rules

In cooling mode, indoor fan runs all the time and the speed can be selected as high, medium, low and auto. (As high, medium, low, auto and turbo for 24k models)

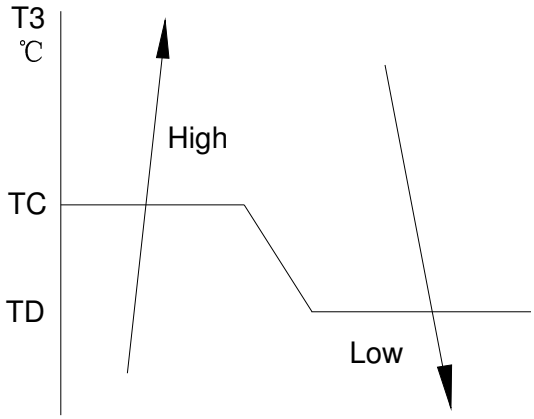
Auto fan in cooling mode acts as follow:



8.4.2.4 Outdoor fan speed control (MSR1-21CR-NB6W, MSR1-24HR-NB6W, MSR1-24CR-NB6W models)

Outdoor fan and compressor start up at the same time, outdoor fan stop 30s delay after the compressor stopped.

The outdoor fan has two speeds, it's controlled by T3 as following rules:



8.4.2.5 Evaporator low temperature T2 protection.

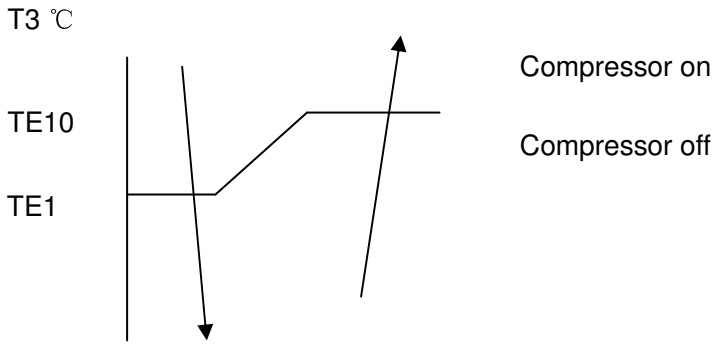
Anti-freezing control to indoor evaporator at cooling mode

When T2<TE5 continuous for 5 minutes, the compressor and outdoor fan will stop and restart until T2>TE6 (for 7k, 9k, 12k, 16k,17k,18k,22k models)

When T2<TE5 continuous for 4 minutes, the compressor and outdoor fan will stop and restart until T2>TE6 (for 21k,24k models)

8.4.2.6 Condenser high temperature T3 protection. (Only for MSR1-21HR-NB6W, MSR1-21HR-NB8W, MSR1-24HR-NB6W, ELBR-KFR70G/N1Y-R1R15(B8)-W models)

Auto fan in cooling mode acts as follow:



When T3≥TE10, the compressor will shut off. When T3＜TE11,the compressor will restart.

8.4.3 Dehumidifying mode

For 7k, 9k, 12k,16k, 17k,18k,22k models:

8.4.3.1 Indoor fan speed is depended on compressor, compressor starts, indoor fan in low speed, compressor stops, indoor fan in breeze speed.

8.4.3.2 The action of outdoor fan and compressor are the same is according to the room temperature and set temperature.

NO	Temperature	Compressor and outdoor fan actions		Indoor fan actions
1	T1 ≥TS+2	ON 6min	Alternated action	Low speed
		OFF 4min		Breeze speed
2	TS ≤T1＜TS+2	ON 5min	Alternated action	Low speed
		OFF 5min		Breeze speed
3	T1＜TS	ON 4min	Alternated action	Low speed
		OFF 6min		Breeze speed

8.4.3.3 If the room temperature decreased to lower than 10℃, the compressor and outdoor fan will stop, indoor fan in breeze speed. If the room temperature raised to higher than 13℃, recover the dehumidify mode.

For 21k, 24k models:

8.4.3.4 The indoor fan will keep running at low speed.

8.4.3.5 The outdoor fan, compressor and all the protections are the same with cooling mode.

8.4.4 Heating Mode

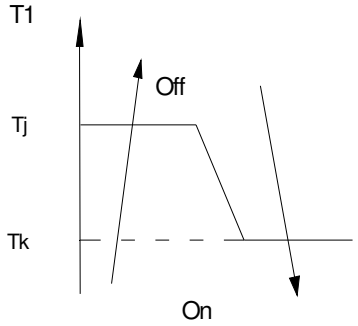
8.4.4.1 Four-way valve control

The four-way valve is open except in defrosting mode.

8.4.4.2 Compressor and outdoor fan running rules

Once the compressor starts up, it will follow the below rules:

When indoor room temp.T1 is higher than Tj, the compressor and outdoor fan will shut off. When T1 is lower than Tk, the compressor and outdoor fan will start up.



Tj=Ts+Tc

Tk=Ts+Tc-1.

Tj=Ts+Tc

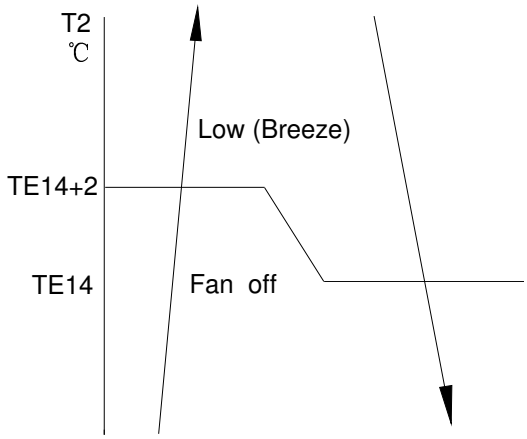
Tk=Ts+Tc-2 for MSR1-22HRN1-NB8W model.

8.4.4.3 Indoor fan running rules:

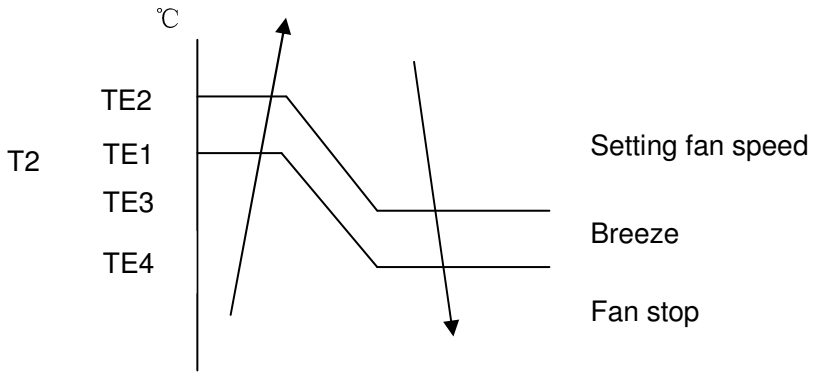
Indoor fan speed can be selected in high, medium, low and auto.

8.4.4.3.1 Indoor fan running rule in anti-cold wind function mode

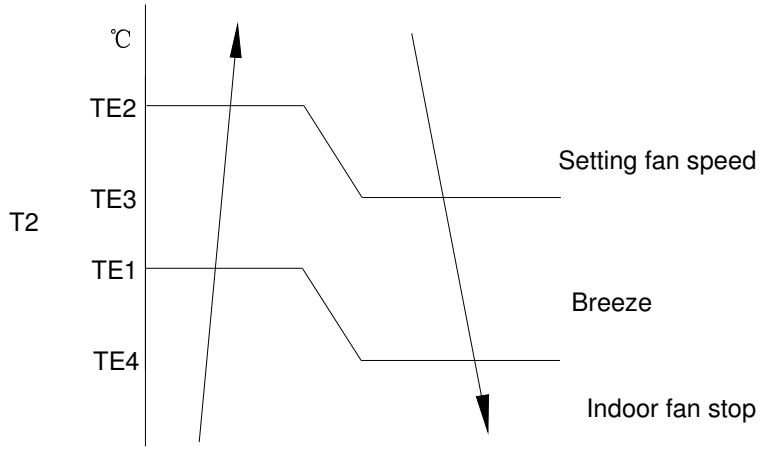
When the compressor is off because off the room temperature rising or the protection, the indoor fan will run as below rule :(for 21k,24k models**)**



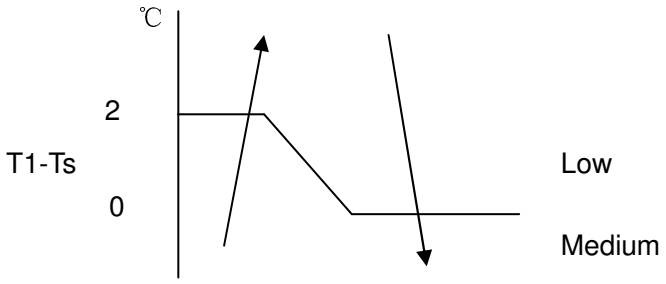
The anti-cold wind function is controlled by the evaporator temperature, refer the principle to the following chart:



For 24k model:

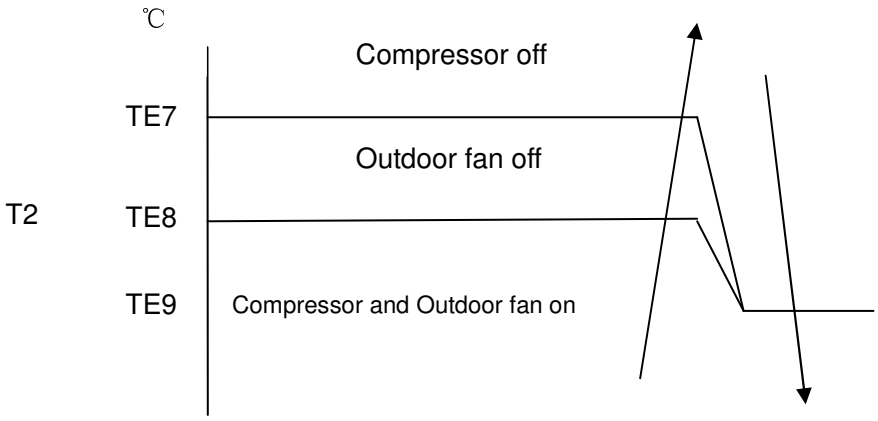


8.4.4.4 Auto fan action in heating mode.

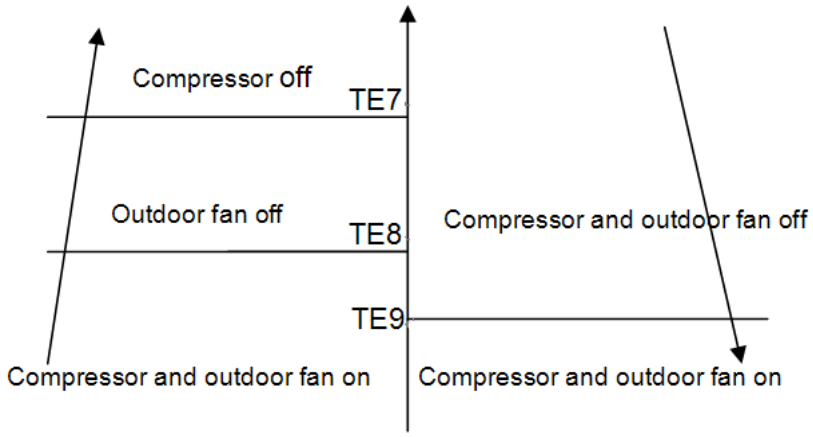


8.4.4.5 High evaporator coil temp.T2 protection:

For 7k,9k, 12k, 16k,17k,18k,22k models:



For 21k,24k models:



8.4.4.6 Defrosting mode：

For 7k,9k, 12k, 16k,17k,18k models(except MSR1-09HRN1-NB8 and MSR1-12HRN1-NB8):

1) Defrosting condition:

Defrosting starts when either of the following ①&②**:**

① A and B are satisfied:

A: The compressor keeps running for 40 minutes or more.

B: The temperature difference of evaporator and room temperature meets one of the following：

℃ / Fan speed	T2-T1	Note
High	＜$TH_{DEFROST}$	If indoor fan is in high speed and T2-T1< $TH_{DEFROST}$, start defrosting
Medium	＜$TM_{DEFROST}$	If indoor fan is in medium speed and T2-T1< $TM_{DEFROST}$, start defrosting
Low	＜$TL_{DEFROST}$	If indoor fan is in low speed and T2-T1< $TL_{DEFROST}$, start defrosting
Breeze or stop	/	If indoor fan is breezing or stopped, start defrosting

② Calculate from the end of latest defrost, evaporator high temp. Protection only closes outdoor fan with the compressor still running add up to 90 minutes.

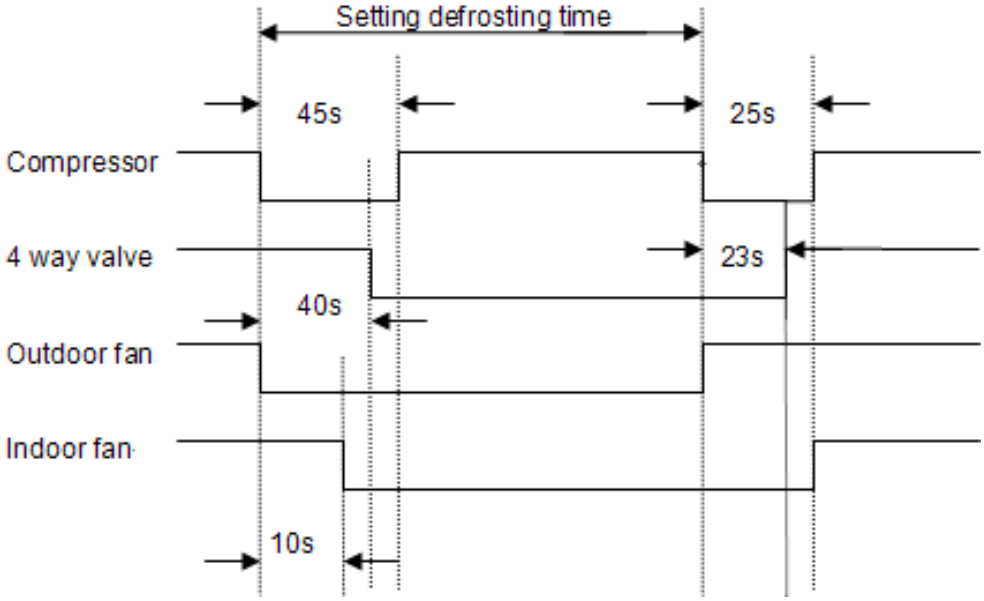
2) Condition of ending defrosting:

If any one of the following items is satisfied, the defrosting will terminate and the machine will turn to normal heating mode.

(1) The defrosting time is reached to the setting value.

(2) The compressor current reaches or exceeds $I_{DEFROST}$ for 7 seconds.

3) Defrosting action：



During the defrosting mode, if the machine stopped or transferred to other mode, the defrosting mode will stop, and all the defrosting conditions will be cleared.

For MSR1-09HRN1-NB8 and MSR1-12HRN1-NB8:

Condition of defrosting:

If any one of following items is satisfied, defrosting will start.

Condition 1: Both the following conditions are satisfied:

A: If the working time of the compressor accumulates to 42 min and one continuous working time is more than 330s.

B: Check the temperature difference between T2 and T1

℃ / Fan speed	T2-T1	Note
High	$<TH_{DEFROST}$	If indoor fan is in high speed and T2-T1< $TH_{DEFROST}$, start defrosting
Medium	$<TM_{DEFROST}$	If indoor fan is in medium speed and T2-T1< $TM_{DEFROST}$, start defrosting
Low	$<TL_{DEFROST}$	If indoor fan is in low speed and T2-T1< $TL_{DEFROST}$, start defrosting
Breeze or stop	/	If indoor fan is breezing or stopped, start defrosting

Condition 2: If the accumulated time of outdoor fan stopped but the compressor keep working due to evaporator high temperature protection mode reaches 90 min from the end of last defrosting mode.

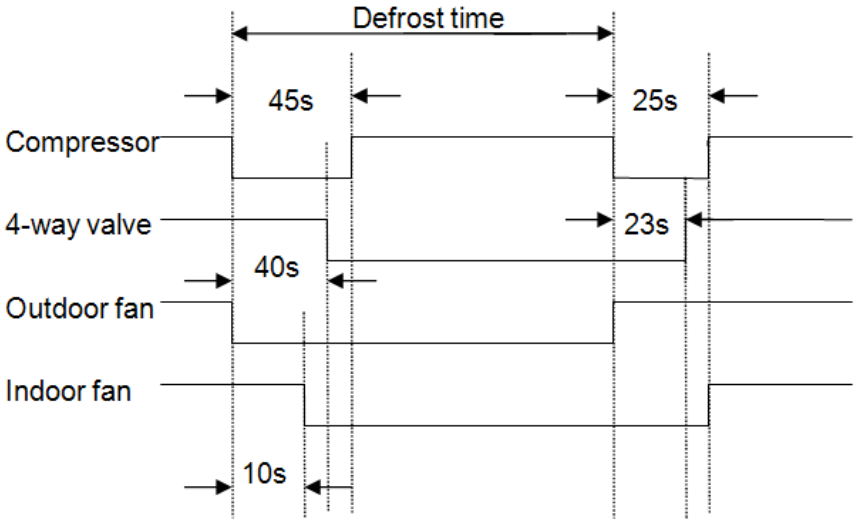
Condition of defrosting stop:

If any one of following conditions occurs, the defrosting will finish and the machine will turn to normal heating mode.

Condition 1: Reached the defrosting time.

Condition 2: The current of compressor is more than $I_{defrost}$ continuously more than 7s. The value of $I_{defrost}$ is depending on the exactly machine.

Defrosting actions：



During the defrosting mode, if the machine stopped or transferred to other mode, the defrosting mode will stop, and all the defrosting conditions will be cleared.

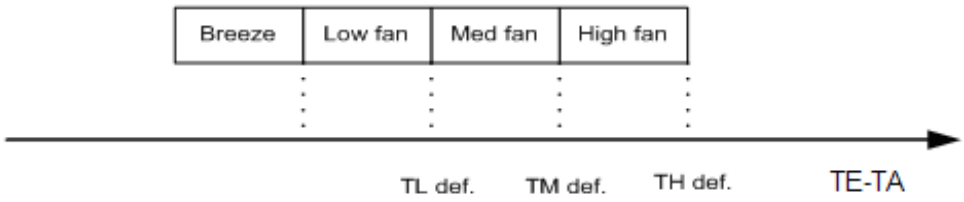
For MSR1-22HRN1-NB8W model:

Defrosting starts when either of the following ①&②:

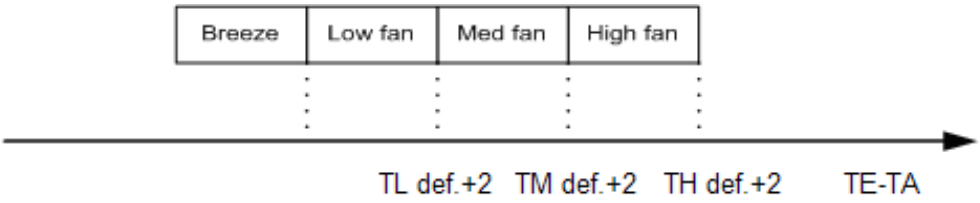
① A and B1 or A and B2 are satisfied:

A: The compressor keeps running for 45 minutes or more.

B1: The compressor keeps running for 45-120 minutes, and the temperature difference of evaporator and room temperature meets one of the following:



B2: The compressor keeps running for 120 minutes or more, and the temperature difference of evaporator and room temperature meets one of the following:



② If the accumulated time of outdoor fan stopped but the compressor keep working in evaporator high temperature protection mode reaches 90 minutes from the end of last defrosting mode.

8.4.3.4.2 Defrosting time

	condition	runtime（minute）	Defrosting time（minute）
Case 1	①A、B1	runtime≤60	DT1
Case 2	①A、B1	60＜runtime≤80	DT1+1
Case 3	①A、B1	80＜runtime≤95	DT1+2
Case 4	①A、B1	95＜runtime≤110	DT1+3
Case 5	①A、B1	110＜runtime≤120	DT1+4
Case 6	①A、B2		DT1+5
Case 7	②		DT1+5

At condition ①, If item B is satisfied before item A, it would be regarded as severe frosting and the defrosting time is 10 minutes.

After three times continuous condition ① defrost, the fourth defrost time should be DT1 +5 minutes.

The air conditioner can't run on defrosting mode until the compressor has run for no less than 6.5 minutes.

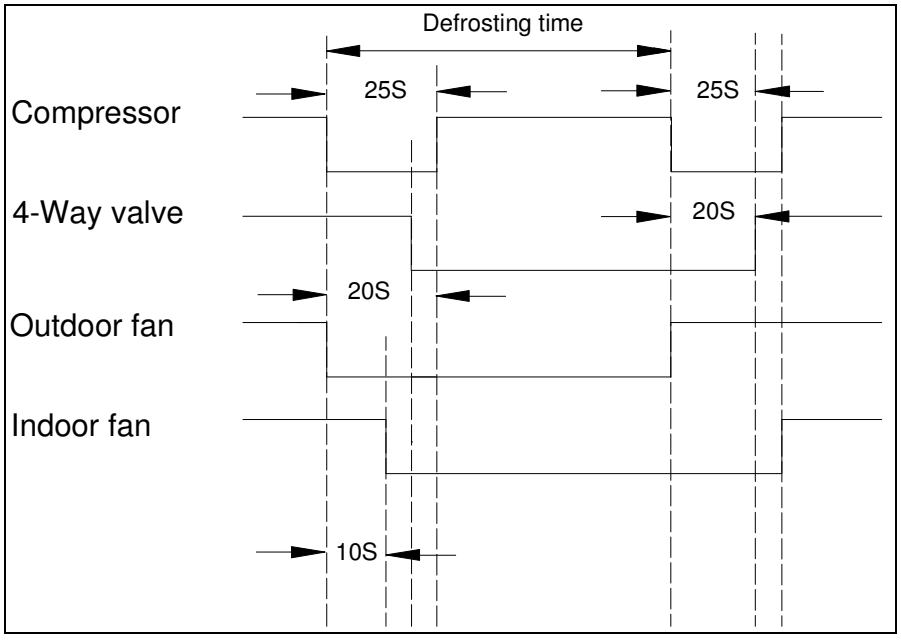
8.4.3.4.3 Ending condition of defrosting

If one of following conditions is satisfied, end the defrost and turn into heating mode:

A. The defrost time has ended

B. The compressor current has reached to $I_{DEFROST}$ or above lasting 7 seconds, $I_{DEFROST}$ differs in different models

8.4.3.4.4 Defrosting Actions



For 21k,24k models:

1) Defrosting condition:

AC will enter defrosting mode if any of the following items is satisfied.

(1) When T3＜TC1℃, if the compressor keeps running over 40 minutes and T3＜TC3℃ for 3 minutes.

(2) After the last defrosting, the time that the outdoor fan is off but the compressor is on in high T2 protection cumulates up to 90 minutes.

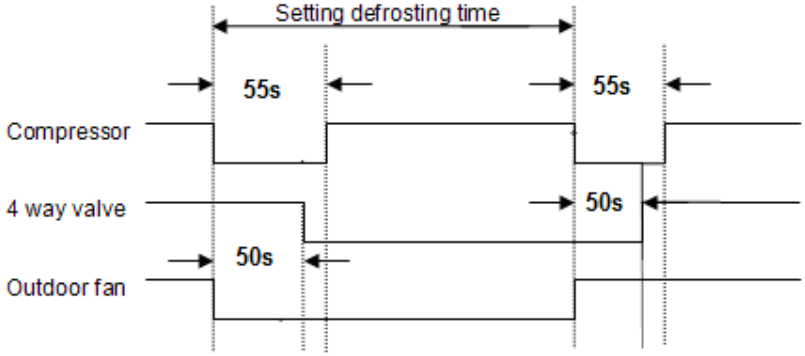
2) Condition of ending defrosting:

If any one of the following items is satisfied, the defrosting will terminate and the machine will turn to normal heating mode.

(1)T3 rises to be higher than TC2.

(2)The machine has run for 10 minutes in defrosting.

3) Defrosting action：



8.4.5 Auto-mode

This mode can be chosen by remote controller and the setting temperature can be changed between 17~30℃.

In auto mode, the machine will choose cooling, heating or fan-only mode according to the difference between T1 and Ts.

For MSR1-18CR-NB6, MSR1-22HRN1-NB8W models:

T1-Ts	Running mode
T1-Ts＞2℃	Cooling
-3℃≤T1-Ts≤+2℃	Fan-only
T1-Ts＜-3℃	Heating (For cooling only model, it will run at Fan-only mode)

For other models:

T1-Ts	Running mode
T1-Ts＞2℃	Cooling
-1℃＜T1-Ts≤+2℃	Fan-only
T1-Ts≤-1℃	Heating (For cooling only model, it will run at Fan-only mode)

Indoor fan will run at auto fan of the relevant mode.

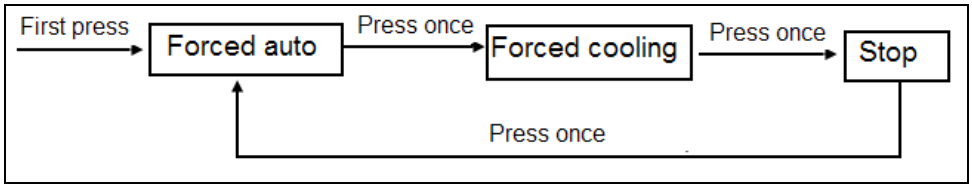
The louver operates same as in relevant mode.

If the machine switches mode between heating and cooling, the compressor will keep stopping for 15 minutes and then choose mode according to T1-Ts again.

If the setting temperature is modified, the machine will choose running function again.

8.4.6 Forced operation function

Press the touch button continually, the AC will run as below sequence:



Forced cooling mode:

The compressor and outdoor fan keep running and the indoor fan runs at low speed. After running for 30 minutes, AC will turn to drying mode (AC will turn to auto mode for 21k,22k,24k models) with 24℃ setting temperature.

Forced auto mode:

The action of forced auto mode is the same as normal auto mode with 24℃ setting temperature.

- When AC receives signals, such as switch on, switch off, timer on, timer off, mode setting, fan Speeds setting, sleeping mode setting, follow me setting, it will quit the forced operation.
- The forced operation function can not be memorized if power off.

8.4.7 Timer function

8.4.7.1 Timing range is 24 hours.

8.4.7.2 Timer on. The machine will turn on automatically when reaching the setting time.

8.4.7.3 Timer off. The machine will turn off automatically when reaching the setting time.

8.4.7.4 Timer on/off. The machine will turn on automatically when reaching the setting “on” time, and

then turn off automatically when reaching the setting “off” time.

8.4.7.5 Timer off/on. The machine will turn off automatically when reaching the setting “off” time, and then turn on automatically when reaching the setting “on” time.

8.4.7.6 For 7k, 9k, 12k, 16k, 17k,18k,22k models the timer function will not change the AC current operation mode. Suppose users set the “timer off” function and AC is off now, the AC will keep the current running mode and then turn off when reaching the setting time. For 24K,models, the timer function will change the AC current operation mode. Suppose users set the “timer off” function and AC is off now, the AC will turn on firstly and then turn off when reaching the setting time.

8.4.7.7 The setting time is relative time.

8.4.8 Sleep function mode

8.4.8.1 Operation time in sleep mode is 7 hours. After 7 hours the AC quits this mode and turns off.

8.4.8.2. Operation process in sleep mode is as follow:

After pressing ECONOMIC or SLEEP button on controller, the machine will turn into sleep mode.

When cooling, the setting temperature rises 1℃ (be lower than 30℃) every one hour, 2 hours later the setting temperature stops rising and indoor fan is fixed as low speed.

When heating, the setting temperature decreases 1℃ (be higher than 17℃) every one hour, 2 hours later the setting temperature stops rising and indoor fan is fixed as low speed. (Anti-cold wind function has the priority)

8.4.8.3 Timer setting is available.

8.4.8.4 When user uses timer off function in sleep mode (or sleep function in timer off mode), if the timing is less than 7 hours, sleep function will be cancelled when reaching the setting time. If the timing is more than 7 hours, the machine will not stop until reaches the setting time in sleep mode.

8.4.9 Auto-Restart function

The indoor unit is equipped with auto-restart function, which is carried out through an auto-restart module. In case of a sudden power failure, the module memorizes the setting conditions before the power failure. The unit will resume the previous operation setting (not including Swing function) automatically after 3 minutes when power returns.

If the memorization condition is forced cooling mode, the unit will run in cooling mode for 30 minutes and then turn to drying mode （auto mode for 21k,24k models）as 24℃ setting temp.

9. Troubleshooting

9.1 Indoor unit error display

For 7k,9k, 12k, 16k, 17k,18k models:

Operation lamp	Timer lamp	Failure
☆	X	Indoor fan speed has been out of control
☆	O	The T1 or T2 sensor is open circuit or short circuit
X	☆	Over current protection occurs 4 times.(except MSR1-07HR-NB4(A), MSR1-09HR-NB4(A), MSR1-12CR-NB4 2T0032500152)
O	☆	EEPROM error
☆	☆	Zero crossing detection error

For MSR1-09HRN1-NB8 and MSR1-12HRN1-NB8 models:

Display	LED STATUS
E1	EEPROM error
E2	Zero crossing detection error
E3	Indoor fan speed has been out of control
E4	Over current protection of the compressor occurs 4 times
E5	Open circuit or short circuit of indoor room temperature sensor
E6	Evaporator temperature sensor open circuit or short circuit

For 21k,24k, ELBR-KFR70G/N1Y-R1R15(B8)-W models:

Operation lamp	Timer lamp	Defrosting lamp(only for heat pump models)	Auto lamp	Failure
☆	☆	☆	☆	Over current protection occurs 4 times.
☆	X	X	X	The T2 sensor is open circuit or short circuit
X	☆	X	X	The T1 sensor is open circuit or short circuit

X	X	☆	X	The T3 sensor is open circuit or short circuit(except 24K)
☆	☆	X	X	EEPROM error
X	X	X	☆	Indoor / outdoor units communication error

O（light） X（off） ☆（flash）

For MSR1-18CRN1-NB8(2T0032800278), MSR1-18CR-NB6 models:

Display	Failure
E1	EEPROM error
E5	The T1 sensor is open circuit or short circuit
E6	The T2 sensor is open circuit or short circuit

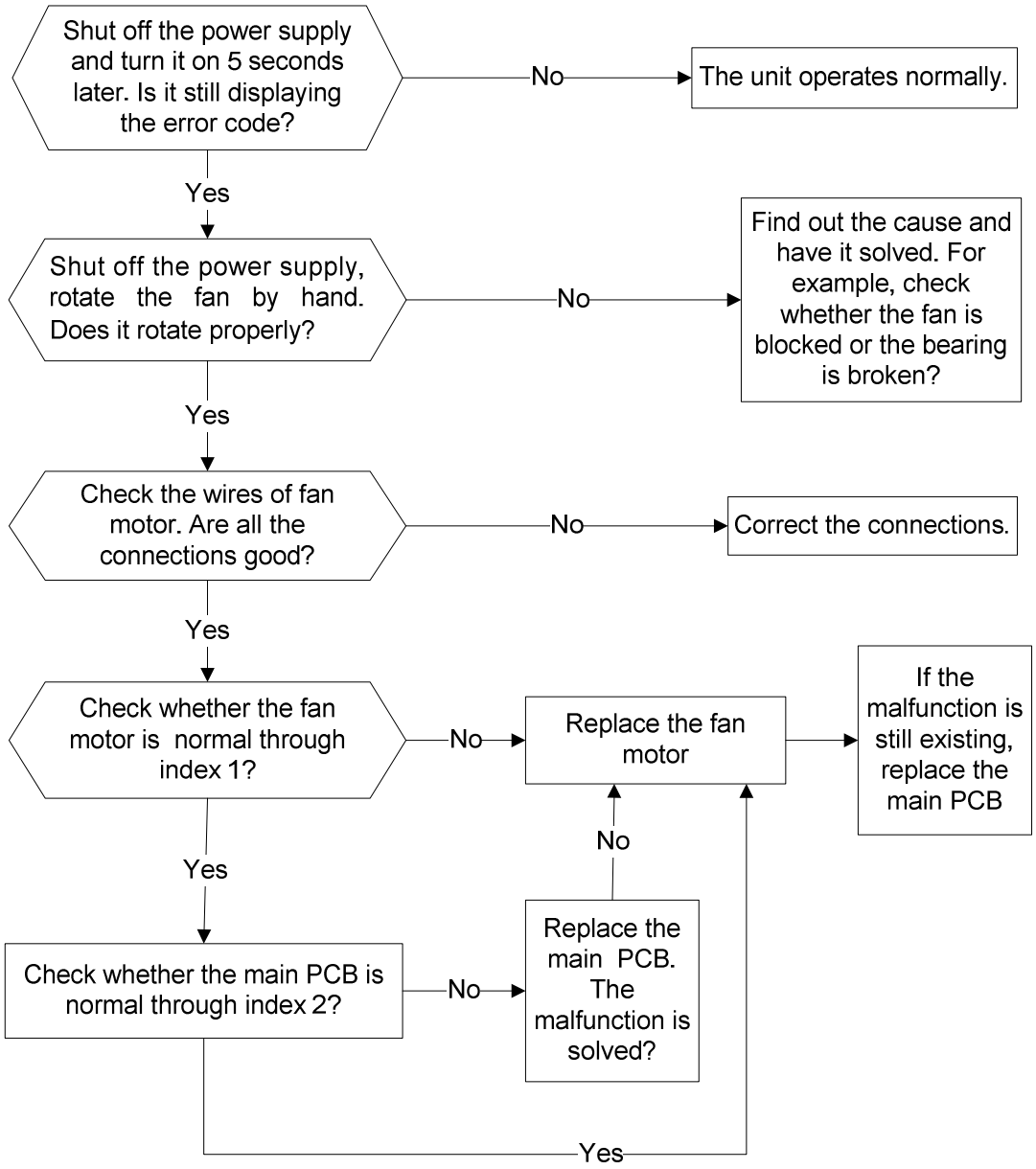
For MSR1-22HRN1-NB8W model:

Operation lamp	Timer lamp	Failure
☆	☆	EEPROM error
x	☆	Indoor room temp. sensor is open circuit or short circuit
☆	x	Evaporator temp. sensor is open circuit or short circuit

X （off） ☆ （flash）

9.2 Diagnosis and Solution

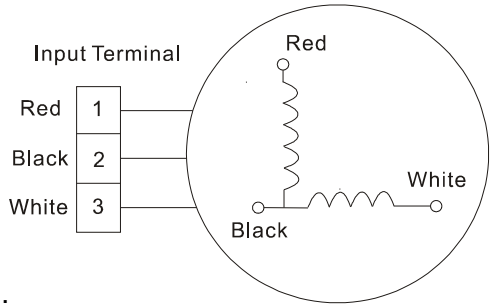
9.2.1 Indoor fan speed has been out of control diagnosis and solution


Shut off the power supply and turn it on 5 seconds later. Is it still displaying the error code?
No
The unit operates normally.
Yes
Shut off the power supply, rotate the fan by hand. Does it rotate properly?
No
Find out the cause and have it solved. For example, check whether the fan is blocked or the bearing is broken?
Yes
Check the wires of fan motor. Are all the connections good?
No
Correct the connections.
Yes
Check whether the fan motor is normal through index 1?
No
Replace the fan motor
If the malfunction is still existing, replace the main PCB
Yes
No
Check whether the main PCB is normal through index 2?
No
Replace the main PCB. The malfunction is solved?
Yes

Index 1:

1.Indoor AC Fan Motor

Measure the resistance value of each winding by using the tester.



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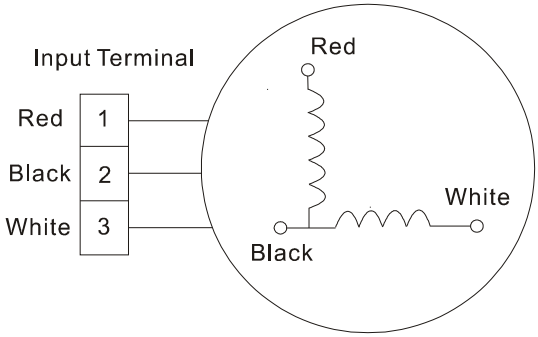
For the definite value of the fan motor, please contact with the technical engineer.

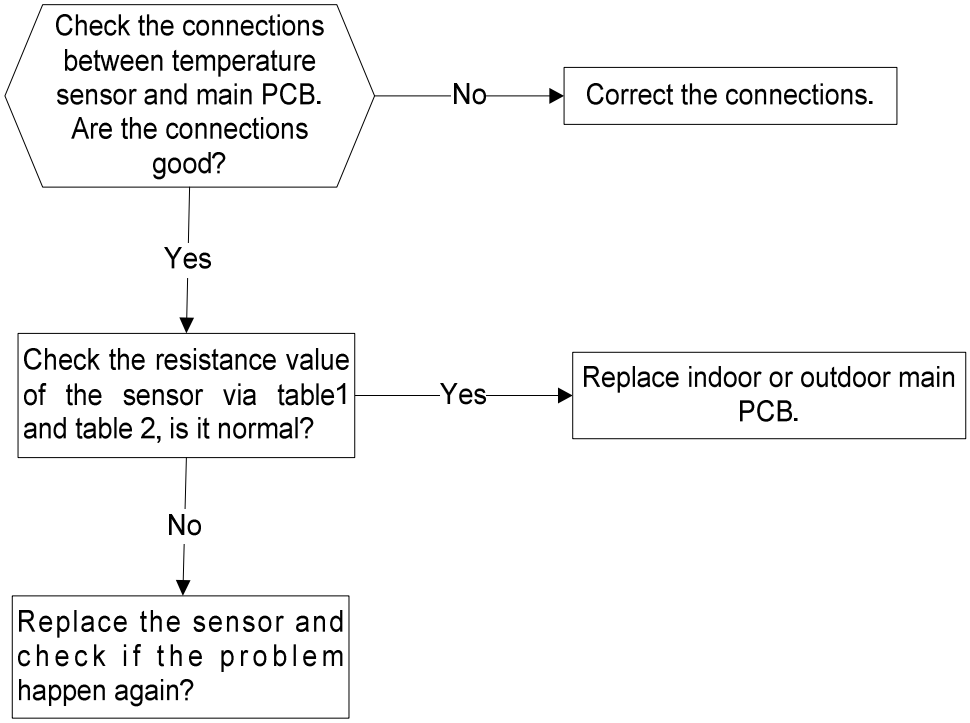
Index2:

1: Indoor AC Fan Motor

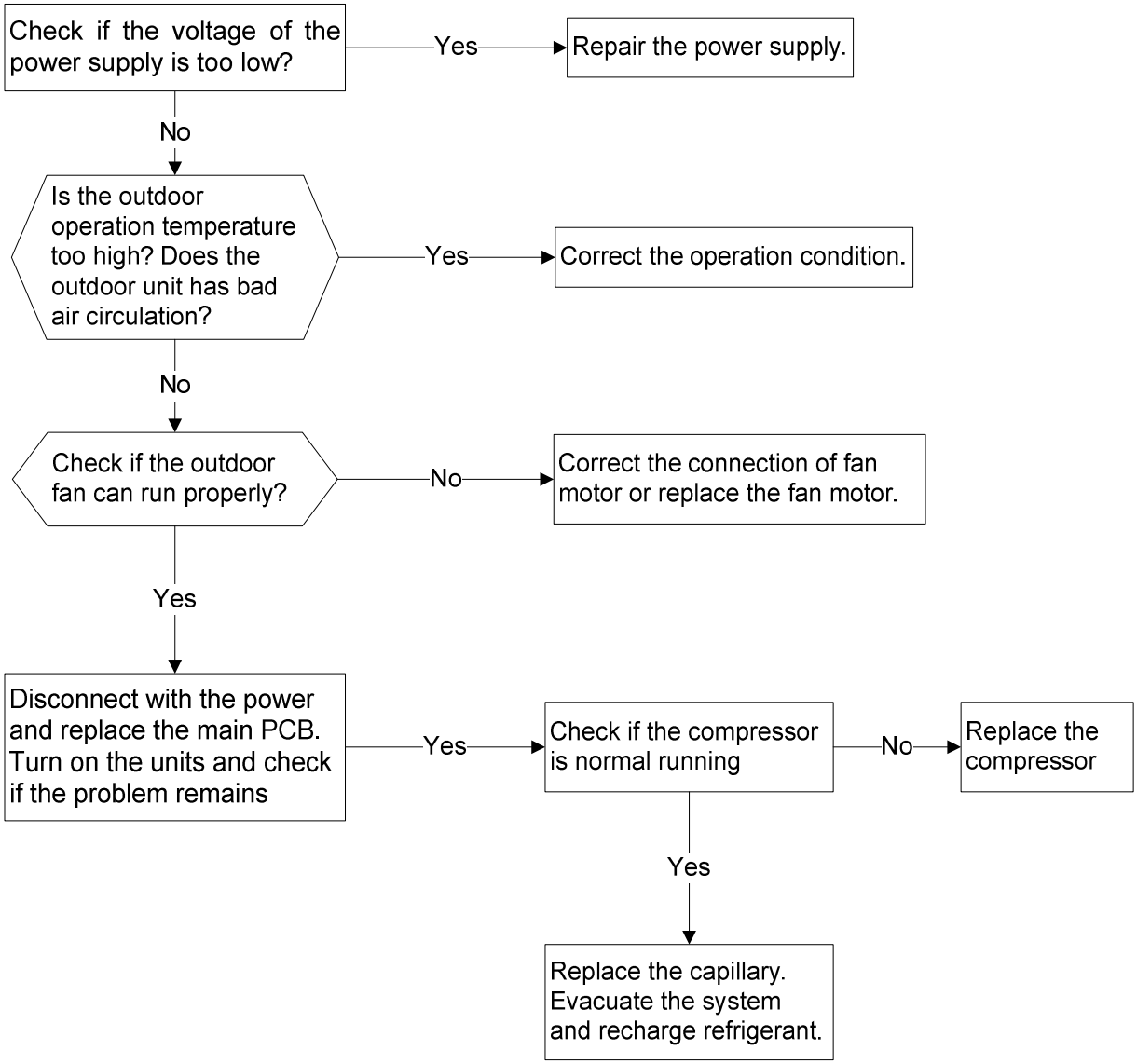
Power on and set the unit running in fan mode at high fan speed. After running for 15 seconds, measure the voltage of pin1 and pin2. If the value of the voltage is less than 100V(208~240V power supply)or 50V(115V power supply), the PCB must has problems and need to be replaced.



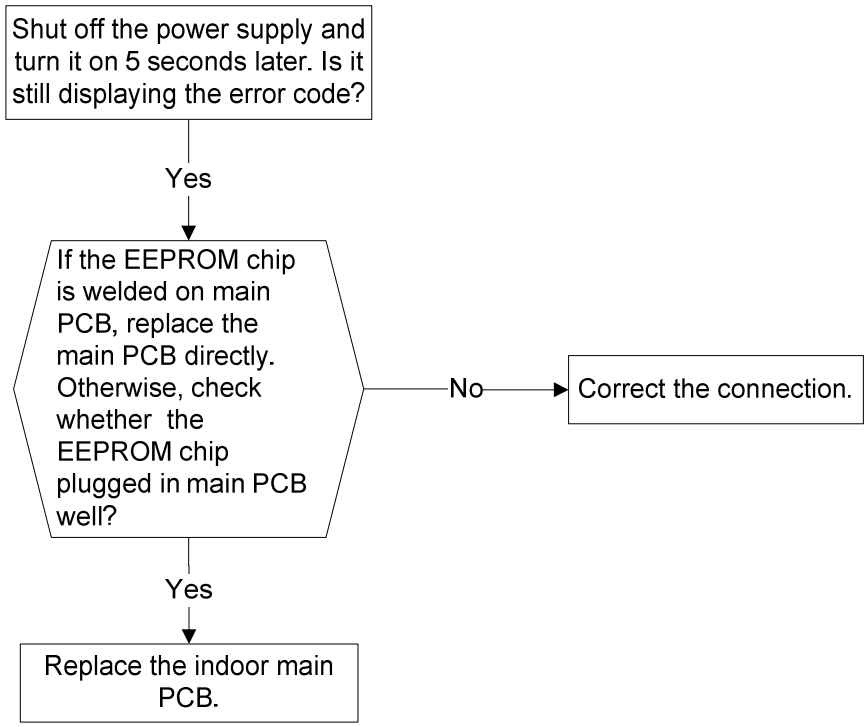
9.2.2 Open circuit or short circuit of temperature sensor diagnosis and solution


Check the connections between temperature sensor and main PCB. Are the connections good?
No
Correct the connections.
Yes
Check the resistance value of the sensor via table1 and table 2, is it normal?
Yes
Replace indoor or outdoor main PCB.
No
Replace the sensor and check if the problem happen again?

9.2.3 Over current protection occurs 4 times diagnosis and solution

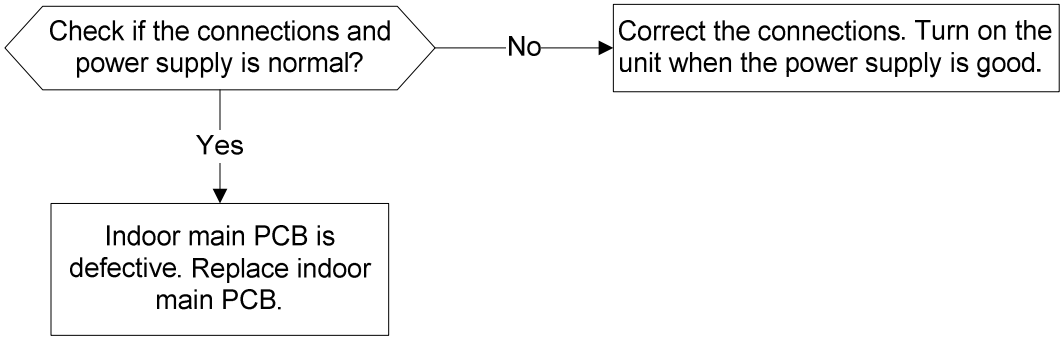

Check if the voltage of the power supply is too low?
Yes
Repair the power supply.
No
Is the outdoor operation temperature too high? Does the outdoor unit has bad air circulation?
Yes
Correct the operation condition.
No
Check if the outdoor fan can run properly?
No
Correct the connection of fan motor or replace the fan motor.
Yes
Disconnect with the power and replace the main PCB. Turn on the units and check if the problem remains
Yes
Check if the compressor is normal running
No
Replace the compressor
Yes
Replace the capillary. Evacuate the system and recharge refrigerant.

9.2.4 EEPROM parameter error diagnosis and solution

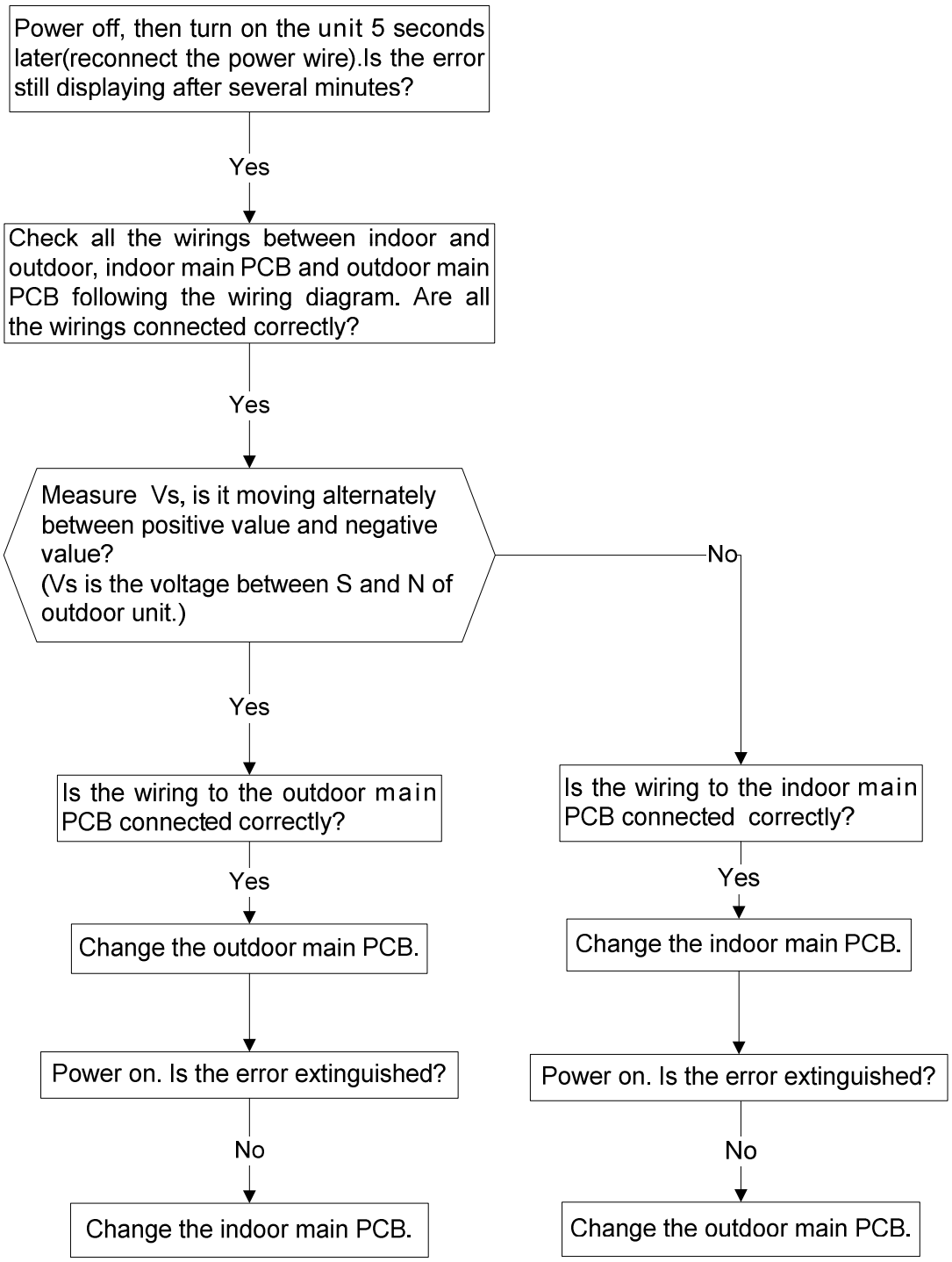

Shut off the power supply and turn it on 5 seconds later. Is it still displaying the error code?
Yes
If the EEPROM chip is welded on main PCB, replace the main PCB directly. Otherwise, check whether the EEPROM chip plugged in main PCB well?
No
Correct the connection.
Yes
Replace the indoor main PCB.

EEPROM: a read-only memory whose contents can be erased and reprogrammed using a pulsed voltage.

9.2.5 Zero crossing detection error diagnosis and solution


Check if the connections and power supply is normal?
No
Correct the connections. Turn on the unit when the power supply is good.
Yes
Indoor main PCB is defective. Replace indoor main PCB.

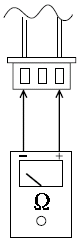
9.2.6 Indoor / outdoor units communication error diagnosis and solution


Power off, then turn on the unit 5 seconds later(reconnect the power wire).Is the error still displaying after several minutes?
Yes
Check all the wirings between indoor and outdoor, indoor main PCB and outdoor main PCB following the wiring diagram. Are all the wirings connected correctly?
Yes
Measure Vs, is it moving alternately between positive value and negative value?
(Vs is the voltage between S and N of outdoor unit.)
No
Yes
Is the wiring to the outdoor main PCB connected correctly?
Yes
Change the outdoor main PCB.
Power on. Is the error extinguished?
No
Change the indoor main PCB.
Is the wiring to the indoor main PCB connected correctly?
Yes
Change the indoor main PCB.
Power on. Is the error extinguished?
No
Change the outdoor main PCB.

Main parts check

1. Temperature sensor checking

   Disconnect the temperature sensor from PCB, measure the resistance value with a tester.



Tester

Temperature Sensors.

Room temp.(T1) sensor,

Indoor coil temp.(T2) sensor,

Outdoor coil temp.(T3) sensor,

Outdoor ambient temp.(T4) sensor,

Compressor discharge temp.(T5) sensor.

Measure the resistance value of each winding by using the multi-meter.

Table 1:Some frequently-used R-T data for T1,T2,T3 and T4 sensor:

Temperature (℃)	5	10	15	20	25	30	40	50	60
Resistance Value (KΩ)	26.9	20.7	16.1	12.6	10	8	5.2	3.5	2.4

Table 2:Some frequently-used R-T data for T5 sensor:

Temperature (℃)	5	15	25	35	60	70	80	90	100
Resistance Value (KΩ)	141.6	88	56.1	36.6	13.8	9.7	6.9	5	3.7

Resistance value (KΩ)